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VASCULAR PLANT STUDY OF WARREN DUNES STATE PARK, BERRIEN COUNTY, MICHIGAN

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ABSTRACT

A botanical survey was conducted to document the plant biodiversity of Warren Dunes State Park (WDSP), located in Lake Township, Berrien County, Michigan. The park consists of 4 km of shoreline and 789 hectares of forested dunes and wetland areas. This information was generated to provide baseline floristic data for WDSP, one of Michigan's most visited state parks, which has not been inventoried as a unit. A documented list of vascular plants was compiled based on over 1,200 samples collected between June 10, 2004 to November 06, 2005. Thirty-three taxa reported and/or documented by other researchers to be present at WDSP that were not collected during this survey were also included on the vascular plant list. The resulting vascular plant list contains 725 taxa (712 species, 8 hybrids, 4 varieties and 1 subspecies). Of these taxa 76% are native and include 8 state-listed threatened species, 2 state-listed special concern and 1 federally listed plant species. Based on comparisons with other Michigan public parks, these results indicate that WDSP is botanically diverse and a refuge for rare species.

KEY WORDS

Berrien County, Biodiversity, Michigan, Vascular Plant, Warren Dunes State Park

INTRODUCTION

Michigan State Parks serve as sanctuaries that protect significant biodiversity. Warren Dunes State Park (WDSP) is a prime example because it contains a high diversity of vascular plant species, including eight state-listed threatened species, two state-listed special concern species, and one federally listed threatened species (Kost et al. 2002). According to the Michigan Natural Features Inventory (MNFI), rare animal species have been also documented in the park, including the state-listed endangered prairie warbler. Significant geographic features found at WDSP according to the MNFI include the mesic northern forest community, open dunes, interdunal wetlands, and unperched dunes (Kost et al. 2002).

There were several studies conducted previously at WDSP. The northern quarter of the park, which is often referred to as the Mount Edward tract, was

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surveyed by Wagner (1979), and Wells and Thompson (1982). Kost et al. (2002) conducted an inventory for significant natural features of the park. Invasive plant species have been inventoried by the State of Michigan (Schneider & Mindell 2003) and control methods are presently being implemented (Palmgren 2004). Although these studies have been conducted and others are underway, the entire park had not been systematically inventoried botanically.

The goal of this study, which is part of a more comprehensive study conducted by Smith (2006), was to provide baseline information to document the floristic biodiversity of WDSP. This information is important because an exotic species control plan has been initiated by the State of Michigan, which included mapping the invasive species but not the native plants or locations for the rare taxa. A floristic list, based on approximately 1201 dried herbarium specimens, 8 photographs collected during this study and reports of 33 species by MDNR and botanical researchers is provided in this report. Qualitative descriptions are included for the major plant communities at WDSP, in addition to brief discussions of the geology, soils, topography and human history.

This information is valuable as a management tool given that WDSP, like so many of our natural areas, is facing a myriad of assaults on biodiversity. Many of these assaults are the result of anthropogenic forces, including pollution, overdevelopment, invasive species, fire suppression, erosion, and excessive deer populations (Kost et al. 2002).

Land Administration

A significant portion of this park is not owned directly by the State of Michigan, but is under a lease agreement that will lapse in 31 years (2037). The organization holding this property, the E. K. Warren Foundation, is in contact with the State of Michigan regarding the future ownership of this land. The original agreement states that the lands leased to WDSP are to be preserved in "perpetuity, in their primeval state for students and lovers of nature" according to Peg Kohring (personal communication, September 07, 2004). Ms. Kohring is the Midwest Director of the Conservation Fund, and represents the organization that is negotiating the E. K. Warren Foundation lease agreement. A large portion of the park is also designated as a state Natural Area and includes much of the land leased from the E. K. Warren Foundation. As this is being written, the northern section of the park is under consideration for designation as a new state Natural Area (Phyllis Higman, Michigan Natural Features Inventory, personal communication, November 30, 2005). Natural Areas are legal designations currently under the jurisdiction of the Michigan Department of Natural Resources under the Wilderness Act of 1972. Natural Area designations came about after it became clear that State Park designations did not protect areas from mining, logging and other consumptive uses. In the past, recommendations were made to State Parks by organizations including the Michigan Natural Areas Council, Michigan Natural Resources Commission, Natural Areas Advisory Board and Michigan Natural Features Inventory, as to which areas were worthy of designation. According to the most recent information provided by MDNR, no new Natural Area dedications have occurred since 1988 (Michigan Department of Natural Resources 2006a).

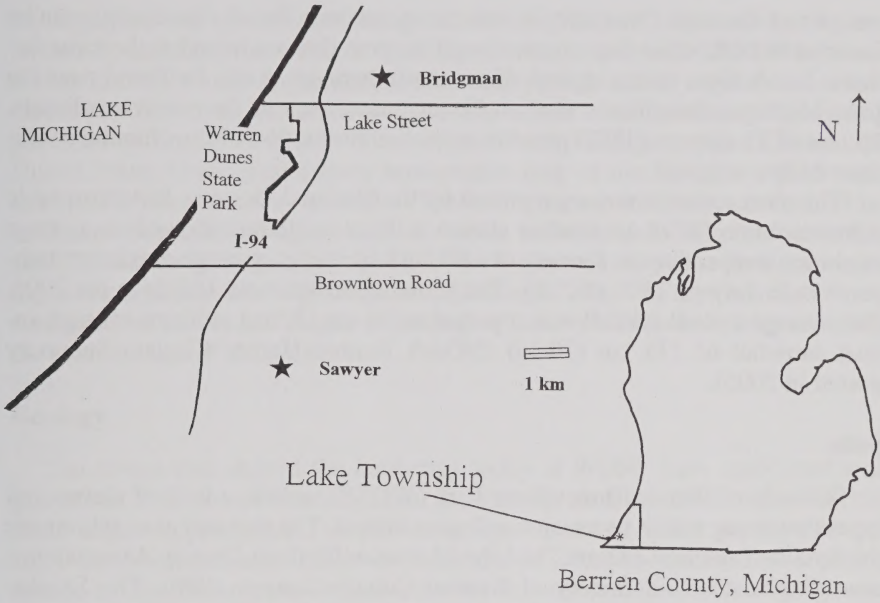

FIGURE 1. Location map of Warren Dunes State Park in Lake Township, Berrien County, Michigan.

Location

WDSP is located on the shore of Lake Michigan in the west central portion of Berrien County, just south of the town of Bridgman and north of the town of Sawyer, Michigan, T6S; R.20W; Sec. 24–26, 35–36 (Figure 1). The park covers 789 hectares (1,950 acres) of forested dunes, open beach, and a variety of wetland habitats. The southern boundary is Browntown Road, and the northern boundary is located south of Lake Street. The park is bounded on the west by Lake Michigan and on the east largely by Red Arrow Highway. The location of WDSP, with the proximity to Lake Michigan, and deep valleys formed by ancient dunes, provides a range of habitats and microclimates that support a diverse assemblage of plants.

Climate

The location of WDSP on the shore of Lake Michigan has a significant effect on the vegetation. The moderating effect of the lake reduces fluctuations in atmospheric temperatures compared to inland areas. Frosts occur later in the fall, while the spring temperatures tend to be cooler than they are in more inland areas. Michigan State University Extension reports that the moderated temperatures are the reason Berrien County has more fruit farms and more cold sensitive crops than any other county in Michigan (Anonymous 2005a). The moderate climate near Lake Michigan, which allows for successful fruit crops in the vicinity of the park, may explain why plants and plant associations typical of the north-

ern part of the state (for example, the mesic northern forest community) can be found at WDSP, while they are not found in areas that are inland at the same latitude. In addition, plants typical of more southern areas can be found near the Lake Michigan shoreline in Berrien County, as a result of the moderate climate. Wells and Thompson (1982) provide a detailed discussion of the climatic conditions of this region.

The most recent summary reported by the National Oceanic & Atmospheric Administration (NOAA) weather station at Benton Harbor showed an average minimum temperature in January of –8°C (18 F) and an average maximum temperature in July of 28°C (82° F). The growing season was 162 days for 2005. The average annual rainfall was reported as 94 cm (37 in), with an average annual snowfall of 178 cm (70 in) (NOAA Benton Harbor Climate Summary posted in 2005).

Soils

The soils of Warren Dunes State Park (WDSP) include a total of eleven soil types that occur within two major soil associations. The two soil associations are the Spinks-Oakville-Oshtemo, and the Morocco-Thetford-Granby Associations, according to the Soil Survey of Berrien County (Larson 1980). The Spinks-Oakville-Oshtemo Association includes level to very steep, well-drained sandy and loamy soils. This association characterizes the western portion of the park, and includes much of the forested dune area and actively shifting dunes. The Morocco-Thetford-Granby Association is found on level, poorly drained sandy soils (Larson 1980) that are common on the eastern edge of WDSP. These soils support lowland hardwood, wetland shrub and swamp habitats.

The two most common soil types within WDSP are in the Spinks-Oakville-Oshtemo Association and include the dune land soil and the Oakville fine sand soils with 18 to 45% slopes. The dune land soils are found in the blowouts, and include the actively shifting sands higher in elevation than the beach area. The dune land soils support beach grasses, as well as a characteristic set of shrubs and trees. The soil type characteristic of the forested dune area of the park is Oakville fine sand. Although a few small areas in this soil type have slopes from 0 to 18%, the majority of the soil slopes are steep to very steep with 18 to 45% slopes, and include slopes in excess of 45%. The Oakville fine sand soils also contain a small percentage (2 to 4%) of shallow depressions of poorly drained Morocco soils (Larson 1980).

A number of different wetland soil types common in the Morocco-Thetford-Granby Association are found at WDSP. The large wetland area near Floral Lane is largely comprised of Houghton muck soil, which is a poorly drained soil, often with standing water. The wetland area near the eastern edge of Mount Randal is characterized by Gilford sandy loam. This soil is level, very poorly drained and typically has standing water, as the water table may vary from 15 cm above to 30 cm below the water table for this soil type (Larson 1980). The wetlands located in the northern section of the park, near the I-94 interchange, are characterized by ponded aquents and histosols. According to Larson (1980), these level soils are found in depressed areas along tributaries of rivers that flow into Lake

Michigan, as well as wet areas along the shores of lakes. These soils are characterized by standing water that is typically present year round. The I-94 wetland area is currently a shrub-dominated community, with marsh vegetation towards the center. However, the north wetland was a lake until quite recently. A map provided by Kost et al. (2002) of the vegetation of Michigan *circa* 1800, and the United States Geological Survey topographic map of the Bridgman quadrangle from 1971, show this area as a lake. The southernmost wetland near the I-94 interchange consisted of aquents and histosols in addition to Granby loamy fine sand. These are level, poorly drained lowlands that are subject to frequent standing water and have a strongly acidic surface layer. This soil type can also be encountered on knolls and ridges according to Larson (1980). It is frequent along the eastern edge of the park.

Geology

The forces that shaped the landscape today at WDSP were associated with glaciation. The last advance of glacial ice into this area is known as the Wisconsinan stage. Approximately 11,000 years ago the most recent glacier retreated from the Michigan area (Dorr & Eschman 1970). The tremendous scouring caused by the movement of massive ice sheets, which may have reached greater than a mile in thickness during glacial stages, and the debris they brought with them, provided tremendous forces that created the Great Lakes and many topographic features. The meltwaters, the lowering of lake outlets, and the post glacial rebound of land resulted in fluctuations of lake water levels that were fantastic compared to today's standards. Lake levels over 60 m (200 feet) higher than those presently encountered (Dorr & Eschman 1970) occurred during post-glacial pre-historic times. The lake level fluctuations that have been recorded in recent history only amount to changes in average lake levels of up to 2.4 m (8 feet), according to data from the Army Corps of Engineers Lake Michigan lake level data (Anonymous 2005b).

The major events that formed the dunes at WDSP (and the east shore of Lake Michigan, in general) occurred when lake levels were about 7.6 m (25 ft) higher than at present. Lake Algonquin and Lake Nipissing are two stages of the ancestral Great Lakes that were associated with two major dune-building events, the first of which occurred 13,000 years ago while the northern part of the state was still glaciated. According to Tague (1946), Lake Algonquin was the greatest of all the ancestral Great Lakes, and combined the area where we find Lakes Michigan, Superior and Huron. The dunes that formed during the Algonquin stage include the oldest and most uncommon (and typically the furthest inland) dune type at WDSP. These are the easternmost dune ridges and formed when the lake level was approximately 7.6 m (25 feet) higher than the present level (Wells & Thompson 1982).

The second major dune-building period during the Lake Nipissing stage also occurred when the lake level was approximately 4.6 to 7.6 m (15 to 25 feet) higher than the present time (Dorr & Eschman 1970). This period, during which the majority of the sand dunes at WDSP formed, occurred approximately 4,000 to 6,000 years ago (Albert 2000). The lake fluctuated to levels both higher and

lower than those typical of present day, between the Lake Algonquin and Lake Nipissing stages. According to Albert (2000), dune growth is perpetuated by higher lake levels because erosion increases and more sand is available than when lake levels are lower. Tower Hill, located in the southern part of WDSP near the parking area, was given by Dorr and Eschman (1970) as an example of a large dune that formed during the Lake Nipissing stage. They noted the very steep windward face of Tower Hill was a blowout, which "has resulted from the reactivation of an ancient sand dune" (Dorr & Eschman 1970, p. 201).

The Algoma stage was a recent lake level intermediate between the Nipissing level and the present day lake level. Algoma ridges reached 180 meters (590 feet) above sea level (Tague 1946). These include the forested dune ridges located closest to the shore of Lake Michigan.

High dunes and low dunes represent two major types of coastal dunes at WDSP. The foredune ridges are low dunes and range from 9-15 m high, and are close to the beach. High dunes are over 30 m tall and are located behind the foredunes. These tall dunes are typically stabilized with forest growth and are much older (Dorr & Eschman 1970). Forested dune areas make up the majority of the forested land at WDSP. When the high dunes become eroded they form blowouts, and these modify the original dune ridges into irregular serpentine shapes.

Sand mining has been a prominent land use in southwest Michigan. Two areas have been mined in the past at WDSP. The sand found in the coastal dunes of southern Michigan is prized because of the high quartz content. One of the sand mined areas was located in the central area of the park and another was located in the northern section. Both of these areas appear to be much less biodiverse and have a greater number of non-native species than areas that were not subject to mining.

Topography

The older dune ridges that form the base for the forested dunes have resulted in a complex topography including valleys, flat lowlands, and mildly sloping to very steep slopes in excess of 45% (Larson 1980). Elevations at WDSP range from lake level, which averaged 176 m (577 feet) in September 2005 (Anonymous 2005b), to over 238 m (780 feet) above sea level at the summits of Mount Edward, Mount Randal, and Mount Fuller. The range of habitats formed by the steep topography, offering a variety of slopes and directional slope facings, mixed with a matrix of wetland and well-drained soils, found both in lowlands and on ridges and knolls, provide an amazing array of habitats that contribute to the biodiversity of WDSP.

Human History

The vegetation that exists today at WDSP is a result of a complex interaction between natural and human history. The earliest European explorers were known to have visited this area from 1673 to 1763, while the region was under French rule. Steamships began to appear on the Great Lakes in the early 1800s, and the

first white settlers would settle in the Chicago region in the 1820s (Greenberg 2002). These were significant events because Lake Michigan would provide an important transportation route connecting the previously established eastern cities on the Great Lakes. Wood harvested from the local forests was the fuel for these steam ships.

The first commercial business in Lake Township was logging. Between 1840 and 1850, in the area that is currently WDSP, there were at least four logging piers constructed on Lake Michigan to deliver timber to the steamships (Smith 2006). The logging piers were connected to inland areas and sawmills by horse-drawn railroads (E. K. Warren Foundation 1939). Between 1850 and 1910, virtually all of Michigan's virgin forests were cut down or destroyed by wildfires (Dickmann, 2004). "By the 1920s and '30s, a vast area of Michigan. . . was a wasteland of charred stumps, second growth brushland and abandoned farms" (Dickmann 2004, p. 12).

Edward K. Warren (referred to as E. K. Warren), a resident of the nearby town of Three Oaks, would start a very successful business in 1883 making products from turkey feathers. His most popular turkey feather products, which included horse whips and perhaps his most notable product known as "Featherbone," were both sold internationally. The successful "Featherbone" product involved the replacement of the expensive and brittle whale bone used in the manufacture of women's corsets with turkey feathers, which not only improved the corsets but were cheaper to manufacture than those made of bone. As Warren became increasingly wealthy, he also began buying dune land in the area that makes up a portion of what is currently WDSP (Whalen 1996). Warren established the E. K. Warren Foundation in 1917. His efforts resulted in a new state law (Act 59 of the 1917 session of the Michigan legislature) to create a foundation with the sole mission of protecting land for the public. It was at this time Warren placed 117 hectares (289 acres) of dune land, that included 2 km (1.25 miles) of Lake Michigan frontage, into the Foundation (E. K. Warren Foundation 1939). In 1921, the Michigan State Department of Conservation was established and approved a 99-year lease that would mark the beginning of Warren Dunes as a state park in 1938. People were permitted to use the land prior to 1938, as long as they did not destroy it. Warren was noted as one of the few people who took action to preserve lands for the sole purpose of creating a natural heritage (E. K. Warren Foundation 1939).

The organization "Hope for the Dunes" was organized in 1977 to protect the Mount Edward area, which was being mined for sand according to the Michigan Environmental Council (MEC) (2002). According to the MEC in 1980, Dr. Warren H. Wagner Jr. and Dr. James R. Wells testified at a hearing to protect the Mount Edward area from continued mining activities. In 1981, the Natural Resource Committee (NRC) voted to allow continued mining in the Mount Edward area. The Attorney General of Michigan intervened on behalf of concerned citizens groups, and in 1983 Helen Milliken (wife of former Governor William Milliken) called for protection of the Mount Edward area. As a result of these efforts, a deal was made for purchase of the Mount Edward area by the State of Michigan (Michigan Environmental Council 2002).

Currently, WDSP occupies 789 hectares of land, 4 km of shoreline, and

roughly 10 kilometers of hiking trails. There are 180 modern camping facilities, and 122 campsites with no access to electricity or showers. A group campground is located on Floral Lane. Three mini-cabins are also available for use, as is a sheltered picnic area that can be rented. A concession stand in the beach area is open from Memorial Day though Labor Day (Michigan Department of Natural Resources 2001). In 2005, the current park manager, Michael A. Terrell (personal communication, November, 2005) estimated that 1.2 million visitors came to WDSP making it one of the most popular parks in the state.

MATERIALS AND METHODS

A list of vascular plants was compiled by collecting 1,209 voucher specimens (1201 dried herbarium vouchers and 8 photograph vouchers) while surveying the park between June 2004 through November 2005, following methods described by Woodland (2000). Surveys were conducted so that the same areas were visited multiple times throughout the growing seasons. A map was created each field day to keep record of the areas surveyed as a means to include the entire park. Specimens were collected both in flower and fruit as much as possible throughout two growing seasons. Most of the specimens were collected in triplicate unless the removal of specimens would impact the local population. GPS coordinates, habitat notes and physical descriptions of the locations were also included with each sample collected. A dried herbarium specimen was made for one of the triplicate specimens collected. Photograph vouchers were used in instances when collecting the plants would severely affect the population. Most of these photographed vouchers were orchid species and state-listed threatened species. The photographs and information collected for these plants provide sufficient information to identify the specimens. The specimens collected for this study were deposited at Andrews University herbarium (AUB). The majority of the grasses and sedges collected during this survey were verified or identified by Dr. A. A. Reznicek and at least one of the unmounted triplicate samples was shipped to the University of Michigan Herbarium (MICH).

A list of vascular plants for WDSP was prepared using the specimens collected and identified during this study, in addition to 33 taxa provided by other researchers at WDSP that reported or documented species that were not found or collected during this study. These taxa are noted and included in the vascular plant list with information on who reported or collected the species. The nomenclature follows Voss (1972, 1985, 1996) for the majority of the confers, monocots and dicots. This reference was selected because it is so widely used in Michigan. Pteridophytes follow *Flora of North America* (Flora of North America Editorial Committee 1993). Names of cultivated species follow Bailey (1949) or Swink and Wilhelm (1994), if they were not included by Voss. Species provided on the vascular plant list that are not followed by a collection number are either only known from reports or a voucher specimen that was not located by the authors. The vascular plant list also includes general location and habitat information codes that correspond to location and habitat maps (Figures 2 & 3, respectively) that were made based on the collection information for each sample collected. The list also includes information on each taxon regarding whether it is an introduced species, a federal or state-listed species and also includes a Coefficient of Conservatism or C- value as listed by Herman et al. (2001). The interpretation of the C-value is explained further in the results section.

Descriptions of the characteristic plant communities are also included in this report based on the vascular plants collected and qualitative observations made within the different communities by the authors as well as other researchers who conducted studies at WDSP.

RESULTS

The vascular plant list (Appendix 1), which was prepared based primarily on collections made between June 10, 2004 and November 06, 2005 by the authors, consisted of 725 taxa. These taxa include 712 species, 8 hybrids, 4 varieties and

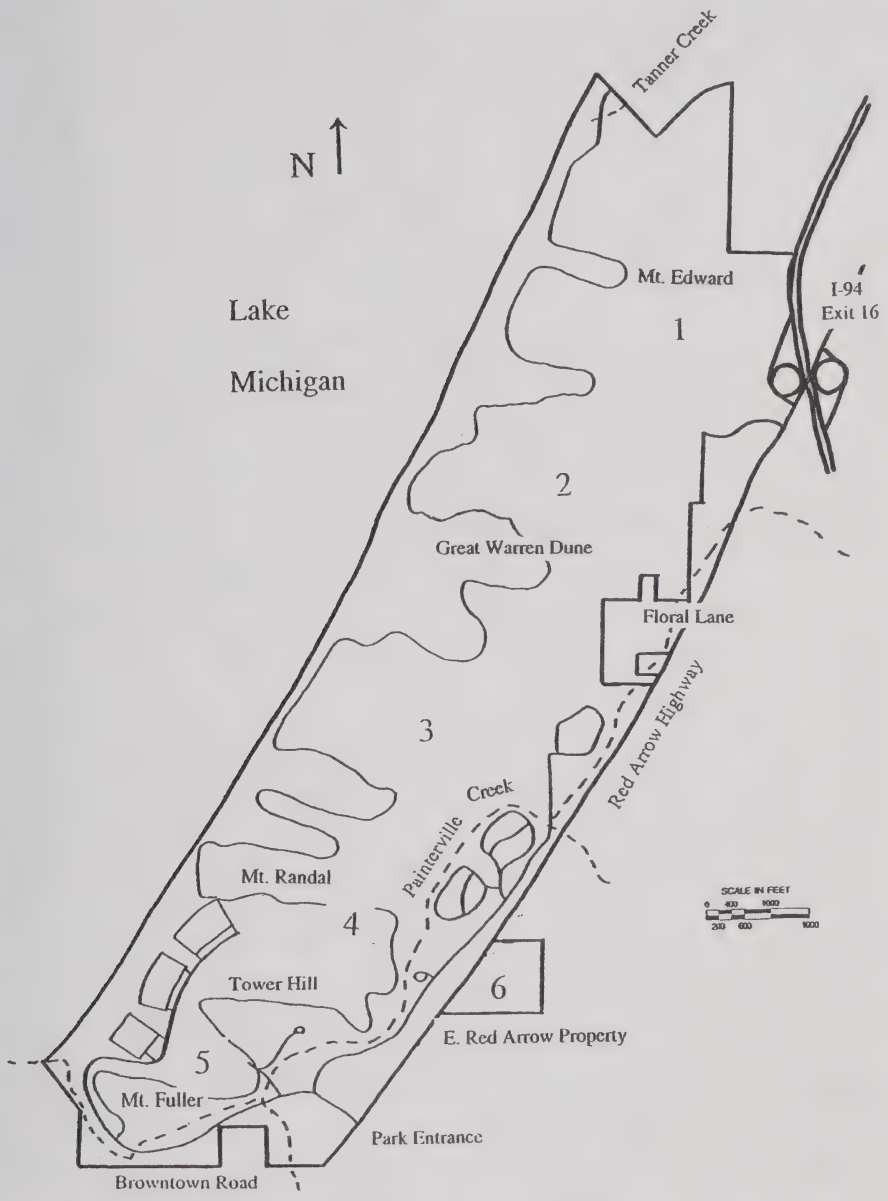

FIGURE 2. Location codes for vascular plant list of Warren Dunes State Park, Berrien County, Michigan. Map Symbol: 1—Mount Edward Tract; 2—Floral Lane Road Area; 3—Great Warren Dune/Natural Area; 4—Mount Randal/Tower Hill Area; 5—Mount Fuller/Browntown Road Area; 6—East of Red Arrow.

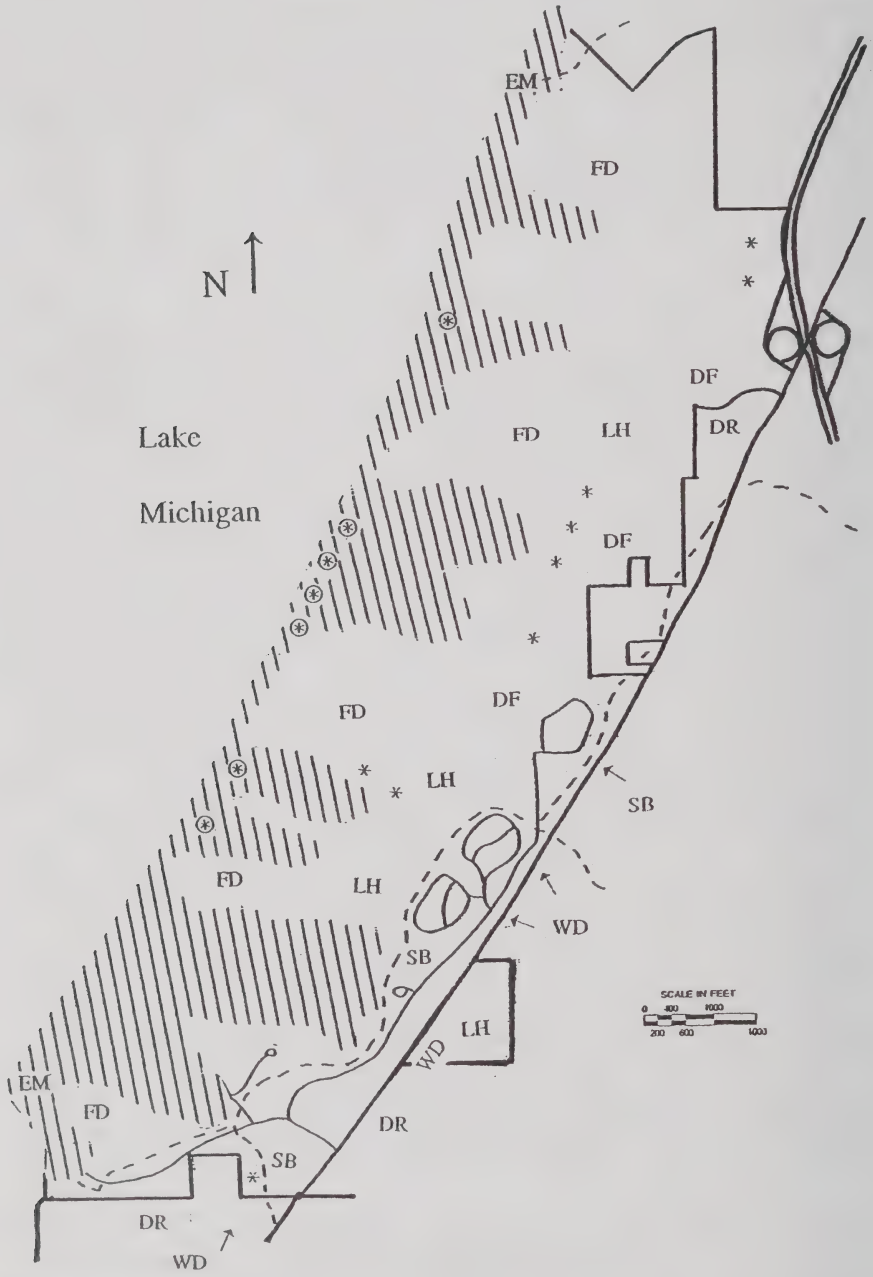

FIGURE 3. Habitat codes for vascular plant list of Warren Dunes State Park, Berrien County, Michigan. Map Symbol: \\\ B—Beach/Blowout; ----- Creek; DF—Disturbed Field; DR—Disturbed Roadside; EM—Emergent Marsh; FD—Forested Dune; ⊛ ID—Interdunal Wetland; LH—Lowland Hardwoods; SB—Stream Bank; * SW—Shrub Wetland; WD—Wet Ditch.

TABLE 1. Taxonomic summary of the vascular plant list for Warren Dunes State Park, Berrien County, Michigan.

Group	Families	Genera	Species*	Total Taxa
Pteridophytes	11	16	27	27
Conifers	3	6	13	13
Angiosperms:				685
Monocots	17	86	195	
Dicots	96	274	490	
TOTAL	127	380	725	725

*List includes 8 hybrids, 4 varieties and 1 subspecies.

1 subspecies. A summary of major taxonomic groups is provided in Table 1. The pteridophytes represented 4%, conifers represented 2%, and the angiosperms represented the majority with 94% of the taxa (Table 1). Of the angiosperms, 28% represented the monocots and 72% the dicots. The Poaceae with 74 species, and Asteraceae with 72 species, represent families with the largest numbers of taxa, each representing about 10% of the total vascular plant list. In addition, the Cyperaceae (56 species), Rosaceae (45 taxa), and Liliaceae (27 species), were well represented families. Non-native plant species accounted for 24% of the total vascular plants (177/725 taxa) at WDSP.

Two species of plants not previously documented in Berrien County were collected during the 2004–2005 floristic survey. *Juncus marginatus* is a native species that has not been documented for the State of Michigan in Berrien County, according to A. A. Reznicek, who identified the specimen (personal communication, 2005). However, it should be noted that *J. marginatus* has been documented by Swink and Wilhelm (1994) in Berrien County for the Chicago region. *Wisteria sinensis* is a garden plant that has escaped from cultivation, and was not previously documented for Berrien County, Michigan. Two uncommon species for Berrien County, *Carex virescens* (a native sedge) and *Bromus sterilis* (a European grass), were collected during this study, and were noted as being scarce and not often collected in Michigan (Voss 1972).

In addition, 38 species ranked 9 or higher for the Coefficient of Conservatism value (C-value). The C-value ranges from 0–10 and represents the probability that a plant is likely to occur in a landscape that is unaltered from its presettlement condition: a zero represents a species that is found in many different landscapes, whereas a 10 represents a plant almost always encountered in a particular type of environment (Herman et al. 2001). A high C– value does not necessarily designate a rare species, but a species that suggests pristine, or relatively intact or undisturbed habitats. However, many of these plants are uncommon or rare species. A list of these species is provided in Table 2.

Threatened Plant Species

A total of seven state-listed threatened species, one federally listed threatened species and two special concern species were previously reported by Kost et al. (2002) at WDSP (Table 3). During the 2004–2005 study, all but two of these species, *Hieracium paniculatum* and *Utricularia subulata*, were documented.

TABLE 2. List of species with a Coefficient of Conservatism (C-value) ranking of 9 or higher at Warren Dunes State Park, Berrien County, Michigan.

Pteridophytes	Dicots	Dicots (con't)
Equisetum x *nelsonii*	*Asimina triloba*	*Panax quinquefolius*
Equisetum palustre	*Cacalia atriplicifolia*	*Pedicularis canadensis*
Woodwardia virginica	*Cirsium pitcheri*	*Salix cordata*
	Conopholis americana	*Salix myricoides*
Monocots	*Epifagus virginiana*	*Saururus cernuus*
Ammophila breviligulata	*Euphorbia polygonifolia*	*Solidago simplex*
Aplectrum hyemale	*Helianthus mollis*	*Stylophorum diphyllum*
Calamovilfa longifolia	*Hieracium paniculatum*	*Tiarella cordifolia*
Carex alata	*Hypericum kalmianum*	*Triadenum virginicum*
Carex cryptolepis	*Linum striatum*	*Utricularia subulata*
Cladium mariscoides	*Liriodendron tulipifera*	
Medeola virginiana	*Lithospermum caroliniense*	
Orchis spectabilis	*Lobelia kalmii*	
Poa alsodes	*Morus rubra*	
Wolffia papulifera	*Nyssa sylvatica*	

An additional threatened species, *Helianthus mollis*, not previously noted by Kost et al. (2002) was collected in 1992 at WDSP and a voucher was deposited at AUB.

The state champion dwarf chestnut oak (*Quercus prinoides*) was noted as being located at Warren Dunes State Park in 1960, with the location listed as "W @ Lake Price & stream" (Ehrle 2003). This specimen was not located during this survey, and neither was Lake Price.

DISCUSSION

Biodiversity can very simply be defined as the number and variety of different organisms in the natural habitats or communities where they occur. It is generally accepted that greater biodiversity is associated with greater stability of an

TABLE 3. List of the state-listed threatened (T), federally listed threatened (FT) and state-listed special concern (SC) plants documented at Warren Dunes State Park, Berrien County, Michigan.

Latin Name	Common Name	Date Documented	Status
Adlumia fungosa	Climbing Fumitory	2005	SC
Cirsium pitcheri	Pitcher's Thistle	2005	FT
Helianthus mollis	Downy Sunflower	1992	T
Hieracium paniculatum	Panicled Hawkweed	1985*	SC
Orchis spectabilis	Showy Orchis	2005	T
Morus rubra	Red Mulberry	2005	T
Panax quinquefolius	Ginseng	2005	T
Trillium recurvatum	Prairie Trillium	2005	T
Utricularia subulata	Zigzag Bladderwort	1993	T
Vitis vulpina	Frost Grape	2005	T
Wolffia papulifera	Nippled Water-meal	2005	T

*Reported by Kost et al. (2002).

ecosystem and that anthropogenic disturbances often reduce biodiversity especially with regard to native species. This study reports a total of 725 different taxa (692 documented and 33 reported by other researchers) for WDSP which occupies 789 hectares of land. Compared to other areas in Michigan WDSP would be considered botanically biodiverse. For example, Grand Mere State Park located just to the north of WDSP, with approximately 550 taxa reported on 357 hectares, is considered to have a highly diverse flora (Palmgren 2000). A floristic study at Sleeping Bear Dunes National Lakeshore, which included 28,329 hectares of land, yielded a vascular plant list of 915 different taxa (Hazlett 1991). The diversity of WDSP is likely linked to the large number of community types. Three different forest communities, lowland swamp forests, a variety of shrub wetlands, as well as the beach and dune communities, with their characteristic vegetation, contribute to the diversity of the park (Figure 4).

Six of the eight state-listed threatened species, one federally listed threatened species, and one of the two state-listed special concern species previously reported for WDSP were documented during the 2004–2005 study period. The documentation of these taxa indicates that this area remains an important refuge for rare taxa.

The natural community inventory conducted by Kost et al. (2002) determined that the forested dunes of WDSP included three forest types: mesic southern, mesic northern, and dry-mesic southern forests. Mesic southern forests are typi-

FIGURE 4. View looking west from the Mount Randal trail showing the forest and dune communities at Warren Dunes State Park.

cally dominated by *Acer saccharum, Carya cordiformis, Fagus grandifolia, Liriodendron tulipifera, Quercus muhlenbergii, Q. rubra,* and *Tilia americana*. This forest type covers the majority of the forested dunes at the park. The mesic northern forest is characterized with similar dominants as the mesic southern forest but also includes *Pinus strobus* and *Tsuga canadensis*. Interestingly, Berrien County represents the southernmost range in Michigan for this community type which covers the northern part of the state to the transition zone. On the west side of the state south of the transition zone, only the three counties that border Lake Michigan (Allegan, Van Buren and Berrien Counties) contain this northern community type (Cohen, no date). The dry-mesic southern forest community is less common at WDSP. It is characterized by *Q. velutina*, *Q. alba*, *Q. rubra* and *Sassafras albidum* as canopy dominants. The study by Kost et al. (2002) noted that the oaks growing on the ridgetops in this community type seem to have growth forms of trees that were grown in open areas, suggesting that an oak barrens or savanna community previously existed. Both the mesic northern and mesic southern forest community types at WDSP are considered by Michigan Natural Features Inventory to be a natural community occurrence because they are in excellent condition and cover a relatively large area of land (Kost et al. 2002). *Fagus grandifolia* and *A. saccharum* were noted by Wagner (1979) as being confined to the richest portions or valleys of the dune areas while *Q. muhlenbergii* and *Q. rubra* were more common in the higher areas of the dune forest.

Spring blooming herbaceous plants contributed to the diversity of the forested dune habitats. During this survey, as many as 40 different herbaceous species were observed in a single day in a 20 x 20 m area. The common spring blooming plants included *Aralia nudicaulis*, *Dentaria laciniata*, *Dicentra cucullaria, Podophyllum peltatum*, *Trillium grandiflorum*, and *Uvularia grandiflora*. Less common spring bloomers included *Arabis canadensis, Arabidopsis thaliana*, *Allium tricoccum*, *Dicentra canadensis*, *Gautheria procumbens, Geranium maculatum, Hydrophyllum appendiculatum, Lobelia siphilitica*, *Mitchella repens*, *Mitella diphylla*, *Panax trifolius*, *Pedicularis canadensis*, *Polygonatum biflorum*, *Smilax herbacea, S. illinoensis,* and *Tiarella cordifolia*. Some rare plants included *Adlumia fungosa* (Figure 5), *Asclepias exaltata, Chimphila maculata*, *Habenaria viridis*, and *Panax quinquefolius* (a state-listed threatened species). *Panax quinquefolius* has been heavily harvested at Warren Dunes State Park despite attempts to discourage the illegal removal of this plant (Goetz 2003). Another threatened species found in the forested dunes was *Morus rubra*, an understory tree species.

Fern species common in the dune forest included *Asplenium platyneuron, Botrychium virgininum* and *Dryopteris marginalis*. Wagner (1979) commented that marginal woodfern, *Dryopteris marginalis,* is an example of a number of plants that reach their south limit at WDSP because of the proximity of Lake Michigan and its moderating effects on climate. He states: "[In] no place in southern Michigan is the species well represented, and we have very few localities; it would be treated as at least rare or even threatened as a plant in southern Michigan, but in the rich dunes forest, especially on the steep slopes, it is abundant and one of the dominant forest floor plants."

Clubmosses included *Diphasiastrum digitatum*, *Huperzia lucidula*, and *Ly-*

FIGURE 5. *Adlumia fungosa* (climbing fumitory) photographed in late summer of 2004 in the Mount Edward area of Warren Dunes State Park.

copodium clavatum. Some of the sedges collected in the dune forest included *Carex albursina, C. eburnea, C. muhlenbergii, C. plantaginea,* and *C. virescens.* Common woodland grass species collected were *Bromus pubescens, Muhlenbergia tenuiflora, Oryzopsis asperifolia,* and *O. racemosa.*

Wagner (1979), surveyed the Mount Edward area and wrote the "Report on the Bridgman Dunes Forest Area (Berrien County, Michigan)." At that time, Martin Marietta Aggregates had cleared a large forested area as part of its sand mining operation in the Mount Edward area. Wagner stated approximately 8.1 hectares (20 acres) of dune forest were already destroyed, and weeds were moving into the forested edges (Figure 6). Wagner's concern was heightened because the forested dunes that comprise the eastern section of the park are considered ancient dunes. The forests that developed on the Algonquin-age dunes were estimated to be about 9,000 years old by Tague (1946), and were considered to be the rarest dune ridge type. The forests that survive on these ridges are thousands of years old and were different from the younger dunes on the western edge of the lakeshore (Wells & Thompson 1982). In this report Wagner (1979, p. 5) stated: "Our present evidence indicates that the mature dune forest in the area north of the north boundaries of the Park, especially in the vicinity of Mount Edward, is the richest in the entirety of Lake Michigan's shores, not only in terms of species diversity but community complexity as well." Wagner noted *Vitis aestivalis,* a plant that barely missed being included on the state threatened species

FIGURE 6. Reclaimed sand mine area in the Mount Edward area of Warren Dunes State Park photographed in 2005.

list at the time of his survey, as uncommon in the rest of the state but very common at WDSP.

Wagner (1979) estimated the total number of plant taxa in the Mount Edward area to be between 200 and 300. Wells and Thompson (1979) noted 311 taxa on their vascular plant list. Based on our observations and these reports it is likely the Mount Edward area may contain a higher number of taxa. The species recorded in 2005 that were not reported in 1979 included *Agastache nepetoides, Calamagrostis inexpansa, Carex muhlenbergii, C. virescens, Juncus torreyi, Lemna trisulca, Lobelia siphilitica, Prosperpinaca palustris, Sisyrinchium angustifolium, Sparganium americanum, S. androcladum, Tiarella cordifolia,* and *Utricularia vulgaris*. Some species that are generally considered to be weeds that were not reported by Wells and Thompson (1979) but that were documented in 2005 include: *Alliaria petiolata, Lonicera morrowi, L. tatarica, L. japonica, Morus alba, Phragmites australis,* and *Ulmus pumila*.

Wagner (1979) noted some taxa not mentioned by Wells and Thompson (1979). These taxa included *Hepatica americana* x *H. acutiloba*, *Dryopteris intermedia*, *D. intermedia* x *D. marginalis* (not located in 2005) and *Stylophorum diphyllum* (found in 2005). Another species noted by Wagner (1979) was *Toxicodendron rydbergii* which is a northern species of poison ivy (not currently recognized by all taxonomists), common on the foredune areas at WDSP.

Twenty-six of the 311 species reported by Wells and Thompson were not found during the 2005 survey. Attempts were made to locate all of these species. It is likely some taxa were missed during the survey or that some of these species may no longer be present, perhaps related to the much larger deer population that now exists or the much drier conditions. Some of the species noted by Wells and Thompson that were not located during this survey (2005) included *Aralia hispida, Blephilia hirsuta, Chimaphila umbellata,Coptis trifolia, Corydalis sempervirens, Goodyera pubescens, Monotropa hypopithys, Pyrola rotundifolia, Silene antirrhina, Sorbus americana,* and *Verbena bracteata.* These are species that should continue to be looked for at WDSP. Wells and Thompson also reported *Comandra richardsiana* and *Aronia melanocarpa* from WDSP; however, these names may be synonymous with *C. umbellata* and *A. prunifolia* (Voss 1985). Unfortunately we were not able to study their collections of these species to verify their identities.

The biodiversity of the forested dune area at WDSP is currently threatened by non-native plants, as well as native and non-native animals. The Emerald Ash Borer is a non-native beetle recently reported at WDSP (Kreiger 2005). This insect poses an immediate threat. It is thought to be responsible for killing nearly all the ash trees in southeastern Michigan. White-tailed deer are native animals that have reached extreme population densities in southwest Michigan, and pose an immediate destructive threat to the biodiversity of the forests. Throughout this forest and the entirety of WDSP heavily browsed foliage and numerous deer trails were evident. The reason some of the species encountered by Wells and Thompson were not found in 2005 may be due to the high deer population. Kost et al. (2002) noted that *Tsuga canadensis* and *Taxus canadensis* are likely to be extirpated in the future at WDSP due to heavy deer browsing. Orchids and other woodland flowers will likely be additional casualties of the high deer density at WDSP.

The deer population has exploded since Wells and Thompson, and Wagner conducted their studies in 1979. According to the Michigan Natural Resources Council (2005), the estimated deer population for the state in 1970 was 500,000 while it was just 50,000 at the turn of the century; in 2004, the number of deer killed by hunting alone in Michigan was 500,000. The estimated population for the State of Michigan in 2004 was 1.75 million deer. The population was higher than the goal established by the State to prevent damage to crops and forests (Michigan Department of Natural Resources 2006b). According to a study conducted by Riley et al. (2003), not only are the current deer populations too high for sustaining forests, but the number of hunters is decreasing as the deer population continues to climb. This does not bode well for protecting the diversity of any of Michigan's natural areas and as Riley states: "Abundant white-tailed deer populations represent one of the greatest challenges in natural resource management early in the 21st century" (Riley et al. 2003, p. 455).

The Lowland Hardwoods

Satellite imaging was used by the Michigan Natural Features Inventory (MNFI) to develop a vegetation cover map for WDSP. The two main forest

cover types were noted as the central hardwoods, which comprise the forested dune areas (previously discussed) and the lowland hardwoods, which are found primarily in the east and southern portions of the park (Kost et al. 2002). Much of the lowland hardwoods have been developed with campgrounds, residences, park headquarters, picnic areas, dump stations, and other facilities. In addition, much of the lowland forested areas have been invaded by non-native species, which may represent a significant portion of the vegetation cover in many of these areas. *Alliaria petiolata*, which is very common in the lowland forest areas, forms a dense cover near Painterville Creek in the central and eastern portions of the park. *Alliaria petiolata* is a dominant herbaceous species almost to the exclusion of all other species in many areas. In the south portion of the park, several species of landscaping shrubs have escaped cultivation and have invaded the lowland hardwoods often forming a dense understory. *Berberis thunbergii* and *Ligustrum vulgare* form dense stands in a number of areas within the park. *Rosa multiflora* and *Vinca minor* are examples of other garden plants that have escaped to the wild and now dominate portions of the shrub and herb layer in the lowland hardwoods. Many of the areas in the lowland hardwoods that have high densities of exotic species also correlate with areas where former residences and campgrounds previously existed.

The lowland hardwood areas were highly disturbed and efforts are underway by the State of Michigan to control many of the invasive species. It was in one of these severely disturbed habitats, that a threatened species, *Trillium recurvatum*, was documented during this survey.

Although some of these lowland forested areas were severely disturbed, some areas still retain a high degree of native plant biodiversity. The forested areas in the lowland hardwoods included *Acer saccharinum*, *A. negundo*, *A. nigrum*, *A. rubrum* (Figure 7), *Carya ovata, Fraxinus nigra, F. pennsylvanica*, *Platanus occidentalis*, *Populus deltoides*, *Quercus bicolor*, *Salix nigra*, *Ulmus americana*, and *U. rubra*. Herbaceous plants included a wide variety of sedges such as *Carex crinita, C. grayi, C. intumescens, C. lupulina, C. rosea*, and *C. vulpinoidea*. Grass species included *Bromus pubescens*, *Glyceria striata, Hystrix patula, Leersia oryzoides, L. virginica,* and *Tridens flavus*. Herbaceous plants included *Allium canadense*, *Asarum canadense*, *Caltha palustris*, *Cardamine bulbosa, Cryptotaenia canadensis*, *Floerkea proserpinacoides*, *Laportea canadensis, Lilium michiganense*, *Lobelia cardinalis*, *Lonicera dioica*, *Impatiens capensis*, *Pilea pumila, Prenanthes alba, Pyrola elliptica*, *Rubus flagellaris, R. hispidus, Viola cucullata*, and *V. rostrata*. Uncommon herbs included *Gentiana andrewsii*, *Peltandra virginica*, *Ribes americanum*, and *Sanicula trifoliata*. Two state-listed threatened species were documented in this survey from this habitat type; *Orchis spectabilis* and *Wolffia papulifera*.

Shrub Wetlands

Shrub-dominated wetlands were found on the eastern edge and the southern part of WDSP. Water levels fluctuated seasonally and from year to year. Spring water levels were visibly higher than during the middle and late summer, when no standing water was observed. These fluctuations likely promote biodiversity

FIGURE 7. *Acer rubrum* (red maple) photographed in one of the lowland hardwood areas at Warren Dunes State Park is an example of the large old growth trees common throughout the park (with field assistant Lynda Pelkey for scale).

by providing an array of habitats for plants and animals. Many of these areas were dominated by native species. Three large areas of shrub wetlands were found in the park and included an area located north of Floral Lane, wetlands near the I-94 interchange (exit 16), and in the vicinity of Browntown Road. These wetlands are described in detail in the following sections. In addition, a small wetland north of the Floral Lane area (Green Heron Pond), is described because this area provides an interesting example of a woodland pond and the diversity among the wetlands that exist at WDSP.

Floral Lane Wetland

The Floral Lane wetland area is best known as a local "hot-spot" for bird watching. The proximity to Lake Michigan and the shrubby habitat are ideal for attracting an exceptional variety of birds. A hiking trail encircles the entire wetland area. This wetland is densely covered by shrubs on the south end and by a swamp forest on the northern end. Characteristic shrubs species include: *Cephalanthus occidentalis*, *Cornus stolonifera*, *Hypericum prolificum*, *Ilex verticillata*, *Physocarpus opulifolius*, *Rosa palustris*, *R. setigera*, and various willows (*Salix* sp.). A large population of *Ligustrum vulgare* has invaded the south end near the Floral Lane roadway. A variety of wetland sedges, bulrushes and grasses col-

FIGURE 8. *Habenaria lacera* (ragged fringed orchid) photographed in the Floral Lane wetland area of Warren Dunes State Park.

lected included: *Carex hitchcockiana, C. gracillima, C. radiata, Panicum rigidulum, Poa alsodes, Leersia virginica, Scirpus acutus*, and *S. atrovirens*. Some of the herbs included *Asclepias incarnata, Chelone glabra, Chimaphila maculata, Habenaria lacera* (Figure 8), *Lysimachia terrestris, L. thyrsiflora, Pyrola elliptica, Saururus cernuus*, and *Sisyrinchium angustifolium.* The trees in the swamp area on the north end of the wetland included *Acer rubrum, Betula alleghaniensis, Carya glabra*, *Fraxinus nigra, Liriodendron tulipifera,* and *Tsuga canadensis*. Fern species in the area included *Dryopteris carthusiana*, *D. cristata, Onoclea sensibilis, Osmunda cinnamomea*, and *O. regalis*.

Green Heron Pond

A small woodland pond (20 m diameter) was located northeast of the Floral Lane wetland. This pond appeared to have no inlet nor outlet, yet was full of fish, some over 10 cm in length. This area will hereafter be referred to as Green Heron Pond, because of the green herons frequenting this area to catch fish. A thick green covering of *Lemna minor* and the surrounding shrubs and trees which included *Acer rubrum, Alnus rugosa*, *Cephalanthus occidentalis, Cornus amomum*, *Fraxinus nigra, F. pennsylvanica*, *Ilex verticillata*, and *Populus deltoides*, gave this area a unique character compared to the other wooded wetlands in the park.

A relatively large specimen of *Alnus rugosa* (16 cm DBH) was found on the shore of the pond. *Acalypha rhomboidea, Carex crinita, Lobelia cardinalis, Senecio vulgaris, Solidago rugosa* and *Thelypteris palustris* were also observed growing on the shore of the pond. A threatened species, *Wolffia papulifera* (*Wolffia brasiliensis*), was documented in Green Heron Pond during this study. This species was first documented at WDSP in the shrub wetlands near I-94 in 1985, where it was noted by Michigan Natural Features Inventory as the only known occurrence for this species in the state (Kost et al. 2002). *Wolffia papulifera* was not found in the I-94 wetlands in 2005. This may be due to the fact this plant is an aquatic species and there was no standing water by mid-summer.

I-94 Wetlands

These shrub-dominated wetlands lie adjacent to interstate 94 west of exit 16, the Bridgman exit. The wetlands were noted by Wells and Thompson (1979), Wagner (1979) and Kost et al. (2002) as being significant areas of biodiversity. Water level changes have had a large impact on this wetland over the last decade. Since this study was initiated in June 2004, the water level had dropped significantly by November 2005, to the point that only the wetland vegetation and a culvert were evidence that standing water was in these ponds. In 1992, the second author of this study was able to use a canoe to navigate these now much drier wetlands. A presettlement vegetation cover map shows this area as a lake (Kost et al. 2002). During this study, an interesting specimen of *Proserpinaca palustris* was collected in which the leaf form typical of submersed leaves was growing above the leaf form typically noted as the stranded, or aerial form, attesting to the seasonal fluctuations of the water levels of this habitat. Wetland soils are evident on the western edge, where a variety of plants that tolerate flooding were observed: *Bidens cernuus* (every plant showed evidence of animal browsing), *Boehmeria cylindrica*, *Cephalanthus occidentalis*, *Cuscuta gronovii*, *Decodon verticillata*, *Lycopus americanus*, *Lycopus uniflorus*, *Saururus cernuus*, and *Sparganium androcladum*. *Woodwardia virginica*, a large fern species, forms a dense stand in some areas. *Geum laciniatum*, *Juncus torreyi*, *Scirpus cyperinus*, *Sisyrinchium angustifolium*, *Sparganium americanum*, *Triadenum virginicum*, *Typha latifolia*, and *Utricularia vulgaris* were other herbaceous plants in this wetland.

Some potential threats to these wetlands include the high deer population that was evidenced by numerous deer trails which were observed throughout the I-94 wetland area. An additional threat could be a non-native genotype of *Phragmites australis*. Although a native genotype is thought to exist, a large very dense population that seems typical of the non-native genotype is growing near the roadside of the I-94 interchange. A small population of *Phragmites australis* was noted during this survey in the center of one of the wetlands. These ponds were also likely disturbed during the interstate construction, as evidenced by a large hose that runs from the southeast edge of the wetland to the road. Further disturbance was noted during the summer of 2005 when the culverts located on the east side of these wetlands were dredged.

Browntown Wetlands

The Browntown Road wetlands are located north of Browntown Road near the southern boundary of the park. Though these wetlands were highly disturbed compared to the wetlands discussed previously, an array of native plants was documented. A creek that runs under Browntown Road bridge was clogged with the aquatic plant, *Elodea canadensis*. Bulrushes and a variety of wetland trees and shrubs were observed growing along this stream. Willow species included: *Salix eriocephala*, *S. myricoides, S. nigra, S. serissima* and a non-native willow *Salix purpurea*. *Juglans nigra* and *Viburnum opulus* were collected on the stream bank. *Eupatorium maculatum*, *E. perfoliatum*, and several species of goldenrods including *Solidago rugosa* dominated the low areas. A dense population of an introduced species, *Epilobium hirsutum*, also dominated a significant portion of this wetland. As with all the wetlands observed over the last two growing seasons, this area seemed drier than what has likely been typical in the recent past. A small stand of river bulrush *Scirpus* (*Bolboschoenus*) *fluviatilis* and associated herbs that were also indicative of very wet conditions including *Elymus virginicus, Lysimachia nummularia*, and *Mentha spicata* were found. The forested areas located upland from this wet habitat included populations of two fern species: *Thelypteris noveboracensis* and *T. palustris*. *Celtis occidentalis*, *Populus deltoides*, and *Tilia americana* were common tree species. Several specimens of *Catalpa speciosa* and *Picea glauca* found in the woods were likely escapes from neighboring homes. Some invasive species that dominated areas of this wetland included *Celastrus orbiculata*, *Hesperis matronalis*, and *Ligustrum vulgare*. This area was shown as a campground in a 1946 map of the park (Smith 2006), and it is likely many of the non-native species that are found in this area today are a result of past land use. These woodlands included two of the seven threatened species that were documented during this study, *Orchis spectabilis* and *Trillium recurvatum*. *Conium maculatum*, an invasive species, was collected in a ditch just south of Browntown Road, across the street from WDSP. This plant will likely be found at WDSP in the near future. It is an introduced species that moves into roadsides and other clearings (Voss 1985).

Open Beach

The showpiece and major attraction of WDSP is the undeveloped beach frontage on Lake Michigan (Figure 9). Five parking lots situated on the beach near the south end of the park handle the majority of the visitors to the park. These parking lots were designed to provide access for 15,000 visitors by accommodating 3,200 vehicles at one time (Neitzke 1955).

The WDSP beach habitat was classified as open dunes by Michigan Natural Features Inventory (MNFI) (Kost et al. 2002). In addition to the beach, this habitat includes coastal dunes and interdunal wetlands that occur within the dune complexes. The vegetation of the open dunes is as distinctive as the habitat. Many of the plant and animal species that characterize the open beach are found only in this habitat (Michigan Natural Features Inventory 1999). The sand beach and dunes experience high winds and extremes in heat from the sun. The sand

FIGURE 9. Warren Dunes State Park beach on Lake Michigan attracts over a million visitors each year.

temperatures frequently reach temperatures of 50°C (120° F) and can reach 80°C (180°F) in areas on a hot summer day (Albert 2000). Some of the characteristic plants inhabiting some of the harshest areas of the beach include *Ammophila breviligulata*, *Artemisia campestris*, *Cakile edentula*, *Calamovilfa longifolia*, *Ptelea trifoliata* and *Salix cordata*. A federally listed threatened plant species, *Cirsium pitcheri*, also inhabits the edges of the foredunes and blowouts and is a Great Lakes endemic species (Michigan Natural Features Inventory 1999). *Andropogon scoparius*, *Lithospermum caroliniense*, and *Prunus pumila*, were found further inland from the beach.

According to MNFI (1999), there are 111,291 hectares (275,000 acres) of sand dunes along the Michigan shoreline. However, many of these areas have suffered from residential developments, road building, sand mining, and a variety of recreational uses. At WDSP, the beach is a high traffic area for off road vehicles (ORVs) despite the fact they are not permitted in the park. Weko Beach, which is owned by the City of Bridgman, is a public beach that borders the park in the north. This area allows a large number of visitors and ORVs entrance to the northern beach of WDSP.

Interdunal Wetlands and Emergent Marshes

Two different types of wetlands were located inland on the beach areas. Two small emergent marshes are located at the mouths of both Tanner and Painter-

ville Creek mouths and seven interdunal wetlands are located behind dunes, near the beaches. Both of these types of wetlands include a unique array of plant species and accentuate the diversity of the park. The emergent marshes included *Eleocharis erythropoda*, *E. olivacea, J. nodosus, Juncus torreyi, Mimulus ringens, Populus balsamifera*, *Salix exigua*, and *S. myricoides*. Two invasive plant species, *Lythrum salicaria* and *Phragmites australis,* were also collected in these wetlands in 2005.

The interdunal wetlands (also referred to as wetpannes by some researchers) are characterized as areas where the water table is at the sand surface. Therefore, the water levels in these wetlands are directly associated with the lake levels (Palmgren 2000). These areas are particularly interesting botanically, because they contain some plant species that are disjuncts from the Atlantic coast (Palmgren 2000). Species characteristic of these interdunal wetlands found at WDSP included numerous rushes (*Juncus balticus*, *J. brachycephalus*, *J. canadensis, J. effusus, J. torreyi*) and sedges (*Carex cryptolepis*, *C. viridula*, and *Cyperus diandrus*). Characteristic bulrushes included *Scirpus acutus* and *S. validus*. *Panicum implicatum* was a common grass species of the interdunal wetlands. Characteristic herbaceous species included *Hypericum kalmianum*, *Linum striatum*, *Lobelia kalmii*, *Potentilla anserina*, and the orchid, *Spiranthes cernua*. Many interdunal wetlands support a diversity of tree and shrub species in addition to herbaceous species. A state-listed threatened species, *Utricularia subulata,* was reported in one of the interdunal wetlands in 1987 by Kost et al (2002), and it was documented in 1993 by Marlin Bowles at WDSP. Attempts by MNFI personnel to locate this species in 2000 (Kost et al. 2002) were unsuccessful and *Utricularia subulata* was also not located during this survey. According to Kost et al. (2002) *Utricularia subulata* is an annual species that is likely to return when the conditions permit because it maintains a seed bank. Marlin Bowles listed *Fimbrystylis autumnalis* as an associate on the voucher specimen for *U. subulata* in the interdunal wetland at WDSP. Although this plant was not documented during this survey (nor did it appear to be collected by Bowles), it could likely be found at WDSP if the conditions permit in the future.

The reason *Utricularia subulata* has been absent from the interdunal wetlands (and other species as well), is likely related to the water level of Lake Michigan. According to Penskar and Higman (1999) these areas are vulnerable to fluctuations in the water level of Lake Michigan. The average lake level is lower than levels recorded in past years, when this taxon was last reported/documented. Photographs taken by the second author of the large interdunal wetland near the Great Warren Dune at WDSP where this species has been previously reported, shows standing water in 1997. The same area in 2005 is barely damp with no standing water (Figure 10). This species has been observed on the edges of interdunal wetlands and is noted to be impacted by hydrological and mechanical disturbances (Kost et al. 2002). During this survey mechanical disturbances (e.g. ORV tracks) were photographed in the interdunal wetland areas (Smith 2006). *Salsola kali*, a non-native plant species, was dominant in some of these wetlands in 2005, and was noticeably denser than observed in 2004. Mechanical disturbance and lake level fluctuations are apparently influencing the diversity of these areas at WDSP.

FIGURE 10. Interdunal wetland located in the Great Warren Dune area of Warren Dunes State Park photographed in 2005.

Interdunal wetlands are considered to be imperiled habitats both in Michigan and on a world wide scale (Palmgren 2000). The beach area of WDSP is also designated by the State of Michigan as critical dune habitat (Michigan Department of Environmental Quality 2006). Critical dune areas found along the Great Lakes are protected because they were found to be unique, irreplaceable, and fragile resources that provide significant value to the people of Michigan. These areas are under significant pressure to be developed.

CONCLUSIONS

This study was undertaken to document and provide baseline data for this park which had not previously been inventoried as a unit. This study demonstrated that WDSP is a sanctuary for a diverse array of vascular plants with over 700 different taxa including 11 rare species. The foresight of E.K. Warren in the early part of the 1900s to protect natural areas for the benefit of the public is the reason this park exists today. Serious threats including overuse of the resources, illegal harvesting of plants, and invasive plants and animals pose real threats to the diversity and stability of this resource. But perhaps the largest threat of all is the lack of understanding of the value of this resource. The people who visit or

manage these resources need to realize the benefits and values of the biodiversity offered by this park. It is important to recognize that natural areas like those found at WDSP offer so much more than a sanctuary for rare plants and animals. Natural areas offer resource protection that benefit humans by providing cleaner air and water in addition to the many other benefits afforded by our vanishing natural areas. The Mount Edward tract in the north section of the park has been recognized for decades as a place worthy of protection and designation as a state Natural Area. Based on our findings during the course of this study we would strongly support such a designation.

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APPENDIX 1. VASCULAR PLANT LIST FOR WARREN DUNES STATE PARK

The list is arranged in alphabetical order by family within basic taxonomic groups. The species recorded on the list were collected by the authors unless otherwise indicated. Each entry gives the common name, Latin name, collection number, status (special concern, threatened etc.), and a Coefficient of Conservatism (C-value) listed in Herman et al. (2001). In addition, habitat and location codes are provided that correlate to the location and habitat maps provided with the vascular plant list (Figures 2 and 3). Non-native taxa or introduced species are indicated by an I on the list.

APPENDIX 1. Vascular Plants of Warren Dunes State Park, Berrien County, Michigan

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
	PTERIDOPHYTES				
ASPLENIACEAE					
Asplenium platyneuron (L.) Britt., Sterns & Pogg.	Ebony Spleenwort	2	1,2	FD	803, 942
BLECHNACEAE					
Woodwardia virginica (L.) Smith	Virginia Chain Fern	10	1	SW	340
DENNSTAEDTIACEAE					
Pteridium aquilinum var. *latiusculum* (L.) Kuhn (Desvaux)	Bracken Fern	0	1	DF	189
DRYOPTERIDACEAE					
Athyrium filix-femina (L.) Mertens	Lady Fern	4	2	LH	297
Dryopteris carthusiana (Villars) H.P. Fuchs	Spinulose Wood Fern	5	2,3,6	FD	569, 940, 1039
Dryopteris cristata (L.) A. Gray	Crested Wood Fern	6	2	LH	1195
Dryopteris intermedia Muhlenberg ex Willdenow	Intermediate Wood Fern	5	1	FD	^Wagner
Dryopteris intermedia × *D. marginalis*	Hybrid wood fern	NA	1	FD	^Wagner
Dryopteris marginalis L.	Marginal Wood Fern	5	2	FD	120, 168
Onoclea sensibilis L.	Sensitive Fern	2	2	LH	291
Polystichum acrostichoides (Michaux) Schott	Christmas Fern	6	6	LH	386
EQUISETACEAE					
Equisetum arvense L.	Field Horsetail	0	3	DF	462
Equisetum hyemale L.	Scouring Rush	2	5	SB	219, 269
Equisetum laevigatum A. Braun	Smooth Horsetail	2	2	ID	701, 955
Equisetum palustre L.	Marsh Horsetail	10	6	LH,D	427
Equisetum × *ferrissii* Clute	Horsetail	2	1,4	B	812, 1037, 1118
Equisetum × *nelsonii* (A. A. Eaton) J. H. Schaffner	Horsetail	10	3	FD	714
LYCOPODIACEAE					
Diphasiastrum digitatum (Dillenius ex. A. Braun)	Southern Running Pine	3	1	FD	858
Huperzia lucidula (Michaux) Trevisan	Shining Fir-moss	5	1	FD	1203

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Lycopodium clavatum L.	Clubmoss	4	1	FD	353
OSMUNDACEAE					
Osmunda cinnamomea L.	Cinnamon Fern	5	2	SW	305
Osmunda regalis L.	Royal Fern	5	2	SW	965
OPHIOGLOSSACEAE					
Botrychium virginianum (L.) Swartz	Rattlesnake Fern	5	1	FD	PHOTO -1209
POLYPODIACEAE					
Polypodium virginianum L.	Common Polypody	8	5	FD	1170
PTERIDACEAE					
Adiantum pedatum L.	Maidenhair Fern	6	2	FD	118
THELYPTERIDACEAE					
Thelypteris palustris Schott	Marsh Fern	2	2,3,5	LH	570, 1003, 1181
Theylypteris noveboracensis L.	New York Fern	5	5	LH	247
	CONIFERS				
CUPRESSACEAE					
Juniperus communis L.	Common Juniper	4	1	B	387
Juniperus virginiana L.	Red Cedar	3	4	LH	440
Thuja occidentalis L.	White Cedar	4	4	FD	384
PINACEAE					
Picea abies (L.) Karsten	Norway Spruce	0 **(I)**	2	FD	371
Picea glauca (Moench) A. Voss	White Spruce	3	4,5	LH	439, 471
Picea pungens Engel.	Blue Spruce	0 **(I)**	1	DF	222
Pinus banksiana Lamb.	Jack Pine	5	5	LH	475
Pinus resinosa Aiton	Red Pine	6	2	DF	706

Pinus strobus L.	White Pine	3	5	FD, LH	250, 279
Pinus sylvestris L.	Scotch Pine	0 **(I)**	4	B	385
Tsuga canadensis (L.) Carr.	Hemlock	5	2	LH	309
TAXACEAE					
Taxus canadensis Marsh.	Canada Yew	5	1	FD	386
Taxus cuspidata Sieb. & Zucc.	Japanese Yew	0 **(I)**	3,5	FD, DF	477, 915
	MONOCOTS				
AGAVACEAE					
Yucca filamentosa L.	Yucca	0 **(I)**	2	B	230
ALISMATACEAE					
Alisma plantago-aquatica L.	Water-plantain	1	4	WD	1028
AMARYLLIDACEAE					
Narcissus pseudonarcissus L.	Daffodil	0 **(I)**	3	LH	393
Narcissus pseudonarcissus L.	Double form Daffodil	0 **(I)**	3	LH	395
Narcissus × *medioluteus* Mill.	White Daffodil	0 **(I)**	4	LH	443
ARACEAE					
Arisaema triphyllum (L.) Schott	Jack-in-the-pulpit	5	4	LH	415
Peltandra virginica (L.) Schott & Endl.	Arrow-arum	6	2	LH	373
COMMELINACEAE					
Tradescantia ohiensis Raf.	Spiderwort	5	4	DF	14
CYPERACEAE					
Carex alata Torrey	Winged Sedge	10	1	SW	850
Carex albursina Sheldon	Sedge	5	1,2,3	FD	578, 834, 1054
Carex amphibola Steudel	Sedge	8	3	FD	908
Carex arctata Boott	Sedge	3	1,2,3	FD	521, 568, 705
Carex blanda Dewey	Sedge	1	2,4,5	LH,SB	450, 548,606,607,649
Carex bromoides Willd.	Sedge	6	4	LH	778
Carex canescens L.	Sedge	8	1	FD	679

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Carex cephalophora Willd.	Sedge	3	1	FD	682
Carex communis Bailey	Sedge	2	5	FD	490, 614, 620
Carex comosa Boott	Sedge	5	1	SW	1022
Carex crinita Lam.	Sedge	4	4	LH	652, 664
Carex cristatella Britton	Sedge	3	1,5	SW	837, 997, 1136
Carex cryptolepis Mack	Yellow Sedge	10	2,4	ID	698, 699, 702, 1036
Carex eburnea Boott	Sedge	7	1,2,4	FD	815,972
Carex gracilescens Steudel	Sedge	5	5	SB	640, 644, 645, 647, 648
Carex gracillima Schw.	Purple-sheathed Sedge	4	1,2	FD	546, 671, 941
Carex granularis Willd.	Sedge	2	4	LH	22, 876, 887
Carex grayi Carey	Gray's Sedge	6	4	LH	643, 870
Carex grisea Wahl.	Sedge	3	3	LH	767
Carex hitchcockiana Dewey	Hairy Gray Sedge	5	1,2,3,4,5	FD	563, 759, 761, 772
Carex intumescens Rudge	Sedge	3	2	SW,LH	544, 722, 853
Carex lacustris Willd.	Lake Sedge	6	2	SW	935
Carex languinosa Michaux	Sedge	8	5	SB,WD	580, 621
Carex laxiflora Lam.	Sedge	8	1	FD	524, 629, 1050
Carex lupulina Willd.	Sedge	4	2,3	LH	762947
Carex lurida Wahl.	Sedge	3	2,4,5	SW	691,692, 833, 873,960
Carex muhlenbergii Willd.	Sedge	7	1,3	FD	862, 865, 866, 1045
Carex pedunculata Willd.	Sedge	5	4	FD	793
Carex pensylvanica Lam.	Pennsylvania sedge	4	1,2,3,4	FD	405, 409,742, 796, 859
Carex plantaginea Lam.	Plantain-leaved sedge	8	1,3	FD	403, 630
Carex (*convoluta*) *radiata* (Wahlenb.) Small	Sedge	2	2	LH	1009
Carex retrorsa Schw.	Sedge				*see C. utriculata*
Carex rosea Willd.	Sedge	2	1,2,4	FD,LH	454, 628, 693, 923
Carex scoparia Willd.	Sedge	4	1,2	SW	689, 850, 1061
Carex stipata Willd.	Sedge	1	1,2,4,5	LH	474, 543, 668, 892
Carex swanii (Fern.) Mack.	Sedge	4	2	LH	937
Carex tenera Dewey	Sedge	4	3	LH	733
Carex tribuloides Wahl.	Sedge	3	1,2,3,4	SW,LH	670,763, 782, 856, 959
Carex utriculata Boott	Sedge	5	1,5	SW	662, 851

Carex virescens Willd.	Sedge	8	1	FD	857
Carex vulpinoidea Michaux	Fox Sedge	1	3	LH	766
Cladium mariscoides (Muhl.) Torrey	Twig Rush	10	2	ID	975, 989
Cyperus diandrus Torrey	Sedge	5	2	ID	137
Cyperus filiculmis Vahl.	Nut Sedge	2	2	SW	1060
Cyperus odoratus L.	Sedge	3	5	EM	1109
Cyperus schweinitzii Torrey	Sedge	5	1	DF	986
Cyperus strigosus L.	Sedge	3	6	WD	1166
Eleocharis erythropoda L.	Spikerush	4	5	EM	1016
Eleocharis olivacea Torrey	Spikerush	7	4	EM	589, 1124
Eleocharis smallii Britton	Spikerush	5	3	LH	678
Rhynchospora capitellata (Michaux) Vahl.	Rhynchospora	6	2	SW	1044
Scirpus acutus Bigelow	Hard-stem Bulrush	5	2	ID	1032
Scirpus americanus Pers.	Three-square	5	4	WD	895
Scirpus atrovirens Willd.	Green Bulrush	3	4	WD	872
Scirpus cyperinus (L.) Kunth	Wool-grass	5	1	SW	335
Scirpus fluviatilis (Torrey) Gray	River Bulrush	6	5	LH	998, 1088, 1154
Scirpus validus Vahl.	Softstem Bulrush	4	4,5	SB,D	637, 777
HYDROCHARITACEAE					
Elodea canadensis Michaux	Elodea	1	5	stream	636
IRIDACEAE					
Iris virginica L.	Southern Blue Flag	5	2	SW	736, 737
Sisyrinchium angustifolium Miller	Blue-Eyed Grass	4	1,2,4	SW	683, 847, 888
JUNCACEAE					
Juncus balticus Willd.	Baltic Rush	4	2,5	SB,ID	588, 697, 976
Juncus brachycephalus (Engelm.) Buch.	Rush	7	2	SW	974
Juncus compressus Jacq.	Rush	0 **(I)**	2	SW	824
Juncus dudleyi Wieg.	Rush	1	4	LH	801, 891
Juncus effusus L.	Soft Rush	3	1	SW, LH	684, 1206
Juncus marginatus Rostk.	Rush	8	2	SW,LH	985
Juncus nodosus L.	Rush	5	4,5	EM, LH	897, 1015

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Juncus tenuis Willd.	Path Rush	1	4	FD	792, 875, 917
Juncus torreyi Cov.	Torrey's Rush	4	2	EM	1013, 1014
LEMNACEAE					
Lemna minor L.	Lesser Duckweed	5	2	SW	389
Lemna trisulca L.	Star Duckweed	6	1	SW	504
Wolffia columbiana Karsten	Watermeal	5	2	LH	1183
Wolffia papulifera C. H. Thomps.	Nippled Watermeal	10 (**T**)	2	LH	1182
LILIACEAE					
Allium canadense L.	Wild Garlic	4	4	DF	23
Allium cepa L.	Onion	0 (**I**)	4	DR	15
Allium sativum L.	Garlic	0 (**I**)	4	DR	900
Allium tricoccum Aiton	Wild Leek	5	4	FD	747
Allium vineale L.	Field Garlic	0 (**I**)	1	DR	852, 924
Asparagus officinalis L.	Asparagus	0 (**I**)	2	DR	577
Erythronium americanum L.	Trout Lily	5	6	LH	429
Hemerocalis fulva (L.) L.	Orange Day Lily	0 (**I**)	1	DR	823
Lilium lancifolium Thunb.	Tiger Lily	0 (**I**)	5	LH	1053
Lilium michiganense Farw.	Michigan Lily	5	3	LH	909
Maianthemum canadense Desf.	Canada mayflower	4	1	FD	523
Medeola virginana L.	Indian Cucumber-root	10	1	LH	672
Muscari atlanticum Boiss. & Reuter	Grape-Hyacinth	0 (**I**)	4	LH	482
Ornithogalum umbellatum L.	Star-of-Bethleham	0 (**I**)	5	DR	619
Polygonatum biflorum (Walter) Ell.	Solomon's-seal	4	1	FD	500
Polygonatum pubescens (Wild.) Pursh	Solomon's-seal	5	4	FD	418
Smilacina racemosa (L.) Desf.	False Solomon's Seal	5	2	FD	119
Smilacina stellata (L.) Desf.	Starry Solomon's Seal	5	4	FD	513
Smilax ecirrata (Kunth) S. Watson	Carrion Flower	6	1	FD	559
Smilax illinoensis Mangaly	Carrion Flower	4	3	FD	561
Smilax lasioneura Hooker	Greenbriar	5	3,4	FD	770, 874
Smilax rotundifolia L.	Common Greenbriar	6	1,2,4	FD	667, 680, 735,741

Smilax taminoides L.	Bristly Greenbriar	5	2	LH	1156
Trillium grandiflorum (Michaux) Salisb.	Common Trillium	5	1	FD	410
Trillium recurvatum Beck	Prairie Trillium	8 **(T)**	5	LH	470
Uvularia grandiflora Sm.	Bellwort	5	1	FD	492
ORCHIDACEAE					
Aplectrum hyemale Willd.	Putty-root	10	2,3	FD	712, 1185
Corallorhiza maculata Raf.	Spotted Coral Root	5	1	FD	PHOTO -1169
Cypripedium calceolus L.	Yellow Lady's Slipper	7	3	FD	PHOTO -720
Epipactis helleborine (L.) Crantz	Helleborine	0 **(I)**	1	FD	167
Goodyera pubescens (Willd.) R. Br.	Rattlesnake Plantain	7	1	FD	W&T
Habenaria lacera (Michaux) Lodd.	Ragged Fringed Orchid	8	2	LH	936
Habenaria viridis var. *bracteata* (Willd.) Gray	Long-bracted Orchid	8	1	FD	PHOTO -525, 566
Orchis spectabilis L.	Showy Orchis	10 **(T)**	5	LH	PHOTO -600
Spiranthes cernua (L.) Rich.	Ladies Tresses	4	2	ID	1157
POACEAE (GRAMINAE)					
Agropyron repens (L.) Beauv.	Quack Grass	0 **(I)**	3,4	DR	798, 906, 1101
Agrostis gigantea Roth	Redtop	0 **(I)**	2,4	D,SW	918, 919, 967
Ammophila breviligulata Fern.	Marram Grass	10	2	B	66
Andropogon gerardii Vitman	Big Bluestem	5	4	DR	1146
Andropogon scoparius Michaux	Little Bluestem	5	2	B	142, 202
Andropogon virginicus L.	Broom Sedge	4	2	DF	1194
Anthoxanthum odoratum	Sweet Vernal Grass	0 **(I)**	2	DF	723, 969
Brachyelytrum erectum (Roth) Beauv.	Long-awned Wood Grass	7	4	FD	953
Bromus inermis Leysser	Smooth Brome Grass	0 **(I)**	1,3	DF	1046
Bromus mollis L.	Soft Chess	0 **(I)**	2	DR	1101
Bromus pubescens Willd.	Canada Brome	5	1,3	FD	821, 914
Bromus sterilis L.	Poverty Brome	0 **(I)**	5	DR	605, 618
Calamagrostis canadensis (Michaux) Beauv.	Blue-Joint Grass	3	2	SW	961
Calamagrostis inexpansa Gray	Bog Reed Grass	8	1	SW	1030
Calamovilfa longifolia (Hooker) Scribner	Sand Reed Grass	10	1,4	B	1078, 1120
Cenchrus longispinus (Hackel) Fern.	Sand Bur Grass	0	4	B	1130
Cinna arundinacea L.	Wood Reedgrass	7	1		174
Cynodon dactylon (L.) Pers.	Bermuda Grass	0 **(I)**	1		^W&T

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Dactylis glomerata L.	Orchard Grass	0 **(I)**	2	DR	1035
Digitaria sanguinalis (L.) Scop.	Crabgrass	0 **(I)**	1,4	LH	1116, 1142
Echinochloa crusgalli (L.) Beauv.	Barnyard Grass	0 **(I)**	4	WD, LH	1026, 1037
Eleusine indica (L.) Gaertner	Goose Grass	0 **(I)**	1	LH	1133
Elymus arenarius L.	Lime Grass	0 **(I)**	1	B	818
Elymus canadensis L.	Canada Wild Rye	7	2	B	71
Elymus virginicus L.	Wild Rye	4	4	B	1123
Eragrostis pectinacea (Michaux) Nees	Love Grass	0	4	DF	1128
Eragrostis spectabilis (Pursh) Steudel	Tumble Grass	3	1	FD	1134
Festuca arundinacea Schreber	Tall Fescue	0 **(I)**	1,2,3	SW	756, 780, 966
Festuca obtusa Biehler	Nodding Fescue	5	2,4	FD,LH	33, 952, 1007
Festuca rubra L.	Red Fescue	0 **(I)**	3	DF	755
Glyceria canadensis (Michaux) Trin.	Rattlesnake Grass	8	1	SW	1082
Glyceria septentrionalis Hitch.	Floating Manna Grass	7	1	SW	1071
Glyceria striata (Lam.) Hitchc.	Fowl Manna Grass	4	2,3,5	SW	734, 764, 966
Hystrix patula Moench	Bottlebrush Grass	5	4	LH	17
Leersia oryzoides (L.) Sw.	Rice Cut Grass	3	6	WD	1165
Leersia virginica Willd.	White Grass	5	2	SW	1058
Leptoloma cognatum (Schultes) Chase	Fall Witch Grass	4	1,4	DF	1100, 1168
Lolium perenne L.	Ryegrass	0 **(I)**	4	FD	791, 838
Muhlenbergia schreberi J. F. Gmelin	Nimblewill	0 **(I)**	1	DF	1205
Muhlenbergia tenuiflora (Willd.) BSP	Slender Satin Grass	8	1	FD	1138
Oryzopsis asperifolia Michaux	Mountain Rice Grass	6	1	FD	496
Oryzopsis racemosa (Sm.) Htich.	Rice Grass	8	4,6	LH,FD	951, 1054
Panicum capillare L.	Fall Witch Grass	1	1	FD	1163
Panicum clandestinum L.	Deer Tongue	3	1,2,5	SB, SW	814, 832
Panicum columbianum Scribner	Panic Grass	7	1	FD	863
Panicum commonsianum Ashe	Panic Grass	6	1	FD	673
Panicum dichotomiflorum Michaux	Panic Grass	0	1	SB,B	1197
Panicum implicatum Britton	Panic Grass	3	2,4	ID, LH	1038, 1057
Panicum latifolium L.	Broad Panic Grass	5	4	FD	954
Panicum oligosanthes Schultes	Panic Grass	5	1,4	DR	12, 864

Panicum rigidulum Nees	Munro Grass	7	2	LH	96
Panicum virgatum L.	Switch Grass	4	2,5	B, DR	68, 215
Phalaris arundinacea L.	Reed Canary Grass	0	1,4,5	SW	854, 894,730
Phleum pratense L.	Timothy	0 **(I)**	3	DR	929
Phragmites australis (Cav.) Steudel	Reed	0	4	D, EM,B	624, 1108
Poa alsodes Gray	Bluegrass	9	2	SW	549
Poa annua L.	Annual Bluegrass	0 **(I)**	3,4	DR	421, 466
Poa compressa L.	Canada Bluegrass	0 **(I)**	1,3,4	DF	800, 1040, 1066
Poa languida Hitchc.	Bluegrass	6	4	DF	740
Poa palustris L.	Fowl Meadow Grass	3	1	SW	855
Poa pratensis L.	Kentucky Bluegrass	0 **(I)**	4,5	LH	615, 783
Poa sylvestris Gray	Woodland Bluegrass	8	1	FD	681
Poa trivialis L.	Bluegrass	0 **(I)**	4	LH	775, 841
Puccinellia pallida (Torrey) Clauson	Puccinellia	7	1	SW	1021
Schizachne purpurascens (Torrey) Swallen	False Melic	5	1		^W&T
Secale cereale L.	Rye	0 **(I)**	1	DR	711
Setaria farberi Herrm.	Giant Foxtail	0 **(I)**	2	DR	326
Setaria glauca (L.) Beauv.	Yellow Foxtail	0 **(I)**	2	DR	328
Setaria viridis (L.) Beauv.	Foxtail Grass	0 **(I)**	4	DF	1126
Sorghastrum nutans (L.) Nash	Indian Grass	6	4	DR	1149
Sphenopholis intermedia (Rydb.) Rydb.	Wedgegrass	4	3,5	SW	765, 994
Sporobolis cryptandrus (Torrey) Gray	Dropseed	3	4	FD	1092
Tridens flavus (L.) Hitchc	Purpletop	3	5	LH	1089
Triticum aestivum L.	Wheat	0 **(I)**	1	DR	665
PONTEDERIACEAE					
Pontederia cordata L.	Pickerel-weed	8			^Graff-511
POTAMOGETONACEAE					
Potamogeton crispus L.	Curley Pondweed	0 **(I)**	5	Creek	638
SPARGANIACEAE					
Sparganium americanum Nutt.	Bur-reed	6	1	SW	1017
Sparganium androcladum (Engelm.) Buch.	Bur-reed	6	1	SW	1189

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
TYPHACEAE					
Typha angustifolia L.	Narrow-leaved Cattail	0 **(I)**	4	D	890
Typha latifolia L.	Cat-tail	1	1	SW	1023
	DICOTS				
ACERACEAE					
Acer negundo L.	Box Elder	0	4	LH	435
Acer nigrum L.	Black Maple	4	4	LH	748
Acer platanoides	Norway Maple	0 **(I)**	5	SB	836
Acer platanoides var. *schwedleri* L.	Crimson Maple	0 **(I)**	3	DF	464
Acer rubrum L.	Red Maple	1	2	LH	316, 367
Acer saccharinum L.	Silver Maple	2	2	SB	536
Acer saccharum Marsh.	Sugar Maple	5	2,4	FD	48, 201
AMARANTHACEAE					
Amaranthus retroflexus L.	Pigweed	0 **(I)**	1	DR	1114
ANACARDIACEAE					
Rhus aromatica Aiton	Fragrant Sumac	7	5	FD	594
Rhus copallina L.	Winged Sumac	3	3	DF	1024
Rhus glabra L.	Smooth Sumac	2	2	FD	218
Rhus typhina L.	Staghorn Sumac	2	5	DF	241
Toxicodendron radicans (L.) Kuntze	Poison Ivy	2	2	LH	827
Toxicodendron rydbergii (Ryde.) Greene	Poison Ivy	3	1		^Wagner
ANNONACEAE					
Asimina triloba (L.) Dunal	Pawpaw	9	1	FD	528
APIACEAE (UMBELLIFERAE)					
Cicuta maculata L.	Water Hemlock	4	4	LH	898, 978
Conium maculatum L.	Poison hemlock	0 **(I)**	5	WD	751
Cryptotaenia canadensis (L.) DC.	Honewort	2	3	LH	36

Daucus carota L.	Queen Anne's Lace	0 **(I)**	1	FD	164
Osmorhiza claytonii (Michaux) C. B. Clarke	Sweet Cicely	4	4,1	LH, FD	35, 520
Osmorhiza longistylis (Torrey) DC.	Sweet-Cicely	3	5	LH	608
Sanicula gregaria Bickn.	Black Snakeroot	2	5	LH	34
Sanicula marilandica L.	Black Snakeroot	4	1	LH	805
Sanicula trifoliata Bickn.	Snakeroot	6	1	LH	150
APOCYNACEAE					
Apocynum androsaemifolium L.	Spreading Dogbane	3	3	WD	912
Apocynum cannabinum L.	Indian Hemp	3	4	WD	879
Vinca minor L.	Periwinkle	0 **(I)**	2, 5	LH	293, 724
AQUIFOLIACEAE					
Ilex aquilifolium L.	Holly	0 **(I)**	2	LH	390
Ilex verticillata (L.) A. Gray	Michigan Holly	5	2	SW	290, 315
ARALIACEAE					
Aralia hispida Vent.	Bristly Sarsaparilla	3	1		^W&T
Aralia nudicaulis L.	Wild Sarsaparilla	5	1	LH	867
Panax quinquefolius L.	Ginseng	10 **(T)**	1	FD	PHOTO -166, 494
Panax trifolius L.	Dwarf Ginseng	8	1	LH, FD	411, 431,495
ARISTOLOCHIACEAE					
Asarum canadense	Wild Ginger	5	2	LH	333
ASCLEPIADACEAE					
Asclepias exaltata L.	Poke Milkweed	6	1	FD	804, 819
Asclepias incarnata L.	Swamp Milkweed	6	2	SB	1005
Asclepias syriaca L.	Milkweed	1	4	DF	39
Asclepias tuberosa L.	Butterfly-weed	5	5	DF	931
Asclepias verticillata L.	Whorled Milkweed	1	2, 3	DF, ID	973, 1093
Asclepias viridiflora Raf.	Green Milkweed	8	4	B	49
ASTERACEAE (COMPOSITAE)					
Achillea millefolium L.	Yarrow	3	2	DR	687

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APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Ambrosia artemesiifolia L.	Ragweed	0	4	DR	1096
Ambrosia trifida L.	Giant Ragweed	0	1	DR	1135
Antennaria neglecta Greene	Pussy Toes	3	5	DF	476
Arctium minus Bernh.	Common Burdock	0 **(I)**	5	SB	993
Artemesia campestris L.	Wormwood	5	2	B	143
Artemesia vulgaris L.	Mugwort	0 **(I)**	1	DF	1140
Aster cordifolius L.	Blue Wood Aster	4	1	FD	221, 382
Aster dumosis L.	Bushy Aster	7	2	ID	227
Aster lanceolatus Willd.	Lance-leaved Aster	2	2,5	SW	1175, 1191
Aster macrophyllus L.	Large-leaved Aster	4	2	FD	122
Aster novae-angliae L.	New England Aster	3	1,2	SB	1171
Aster ontarionis Wiegand	Ontario Aster	6	2	LH	330, 1177
Aster pilosus Willd.	Frost Aster	1	3	DF	1176, 1199
Bidens comosus (A. Gray) Wiegand	Beggar-ticks	5	1	SW	337
Cacalia atriplicifolia L.	Pale Indian-Plantain	10	4	SD	1117
Centaurea maculosa Lam.	Spotted Knapweed	0 **(I)**	2	DF	70
Centaurea maculosa Lam.	Spotted Knapweed-white form	0 **(I)**	1	DF	180
Chrysanthemum leucanthemum L.	Ox-eye Daisy	0 **(I)**	5	DR	726
Cichorium intybus L.	Chickory	0 **(I)**	2	DR	327
Cirsium arvense (L.) Scop.	Canada Thistle	0 **(I)**	3	DR	884
Cirsium muticum Michaux	Swamp Thistle	6	3	LF	910
Cirsium pitcheri (Eaton) T. &. G.	Pitcher's Thistle	10 **(FT)**	5	B	PHOTO -725
Cirsium vulgare (Savi) Tenore	Bull-thistle	0 **(I)**	4	DR	1027
Conyza canadensis (L.) Cronquist	Horseweed	0	2	DR	134
Coreopsis grandiflora Sweet	Garden Coreopsis	0 **(I)**	3	DR	752
Coreopsis lanceolata L.	Tickseed	8	4	DR	880
Erechtites hieraciifolia (L.) DC.	Fireweed	2	2	HL	1161
Erigeron annuus (L.) Pers.	Daisy Fleabane	0	5	LH	611052
Erigeron philadelphicus L.	Fleabane	2	4	WD	662
Erigeron strigosus Willd.	Daisy Fleabane	4	1,2	DF	161, 1008
Eupatorium maculatum L.	Joe-pye Weed	4	4, 5	SB	1104, 1129
Eupatorium perfoliatum L.	Boneset	4	2	SW	94

Eupatorium rugosum Houtt.	White Snakeroot	4	1	FD	154
Eupatorium serotinum Michaux	Late Boneset	0	5	SB	1103
Euthamia graminifolia (L.) Nutt.	Grass-leaved Goldenrod	3	1	DF,B	133, 160
Gnaphalium obtusifolium L.	Fragrant Cudweed	2	2	ID	190,228
Helianthus decapetalus L.	Thin-leaved Sunflower	5	4	LH	82, 191
Helianthus divaricatus L.	Woodland Sunflower	5	1	DF	179
Helianthus sp.	Sunflower	10	1	FD	1087, 1115
Helianthus mollis Lam.	Downy Sunflower	9 **(T)**	2		^Graff-300
Helianthus tuberosus L.	Jerusalem Artichoke	6	1	DF	1139
Hieracium aurantiacum L.	Orange Hawkweed	0 **(I)**	3	FD	721
Hieracium flagellare Willd.	Whip-lash Hawkweed	0 **(I)**	1	DR	1076
Hieracium paniculatum L.	Panicled Hawkweed	10 **(SC)**	1	FD	^MNFI
Hieracium pilosella L .	Mouse Ear Hawkweed	0 **(I)**	3,4	DR	885, 899
Hieracium piloseloides Vill.	King Devil	0 **(I)**	2	ID	703
Krigia biflora (Walter) S. F. Blake	Two Flowered Cynthia	5	5	DR	727
Krigia virginica (Walter) S. F. Blake	Dwarf Dandelion	4	5	DF	261
Lactuca biennis (Moench) Fernald	Tall Blue Lettuce	2	4	DR	1105
Lactuca canadensis L.	Wild Lettuce	2	5	FD	1102
Polymnia canadensis L.	Leaf Cup	6	4	LH	869
Prenanthes alba L.	Rattlesnake Root	5	5	LH	274
Prenanthes altissima L.	Tall White Lettuce	5	2	LH	1160
Rudbeckia hirta L.	Black-eyed Susan	1	4	DR	886, 913
Rudbeckia laciniata L.	Cut-leaved Coneflower	6	4	DR	1148
Senecio aureus L.	Golden Ragwort	5	2	LH	540
Senecio paupercaulus Michaux	Balsam Ragwort	3	2	ID	988
Senecio vulgaris L.	Common Groundsel	0 **(I)**		LH	1200
Solidago altissima L.	Late Goldenrod	1	1	FD	163
Solidago caesia L.	Blue-stem Goldenrod	7	1,2	FD,DF	152, 303
Solidago canadensis L.	Canada Goldenrod	1	1	DF	1188
Solidago gigantea Aiton	Giant Goldenrod	3	1,2	ID	125, 1141
Solidago hispida Willd.	Hairy Goldenrod	3	2	ID	141, 1178
Solidago nemoralis Aiton	Old Field Goldenrod	2	2	ID	205
Solidago rugosa Miller	Rough Goldenrod	3	1,2,5	SW	207, 356
Solidago rugosa var. a*sperifolia* Miller	Rough Goldenrod	3	2	SW	314
Solidago simplex Kunth	Gillman's Goldenrod	10	2	ID	1179

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APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Sonchus asper (L.) Hill	Prickly Sow Thistle	0 **(I)**	1	DR	666
Sonchus oleraceus L.	Sow Thistle	0 **(I)**	3	DR	928
Taraxacum officinale Wiggers	Dandelion	0 **(I)**	2	B	487
Tragopogon dubius Scop.	Goat's Beard	0 **(I)**	5	DR	616
BALSAMINACEAE					
Impatiens capensis Meerb.	Touch-me-not	2	5	EM	1111
BERBERIDACEAE					
Berberis thunbergii DC.	Japanese Barberry	0 **(I)**	3	LH	399
Podophyllum peltatum L.	May-apple	3	1	FD	522
BETULACEAE					
Alnus rugosa (Duroi) Sprengel	Speckled Alder	5	2,5	LH, SB	958, 1110
Betula alleghaniensis Britton	Yellow Birch	7	2, 5	LH, ID	963, 1033
Betula papyrifera Marsh.	Paper Birch	2	5	LH	491, 1192
Carpinus caroliniana Walter	Blue Beech	6	5	LH	268
Corylus americana Walter	Hazelnut	5	1	FD	^W&T
Ostrya virginiana (Miller) K. Koch	Ironwood	5	4	FD	220
BIGNONIACEAE					
Campsis radicans (L.) Bureau	Trumpet Vine	0 **(I)**	3	DR	883, 979
Catalpa speciosa (Warder) Engelm.	Catalpa	0 **(I)**	5	SB	239
BORAGINACEAE					
Echium vulgare L.	Blueweed	0 **(I)**			^W&T
Hackelia virginiana (L.) I. M. Johnston	Stickseed	1	1	FD	183
Lithospermum caroliniense (J. F. Gmelin) MacMillan	Yellow Pucoon	10	2	B	18, 214
Myosotis laxa Lehm.	Forget-me-not	6	3	WD	769
BRASSICACEAE (CRUCIFERAE)					
Alliaria petiolata (Bieb.) Cavara & Grande	Garlic Mustard	0 **(I)**	2	LH	797, 825

Arabidopsis thaliana (L.) Heynh.	Mouse Ear Cress	0 **(I)**	1,2	FD, SB	507, 538
Arabis canadensis L.	Arabis	7	3	FD	744, 826
Arabis laevigata (Willd.) Poiret	Smooth Bank Cress	5	2,5	LH,SW, FD	552, 641,957
Arabis lyrata L.	Lyre-leaved Sandcress	7	4	B	27
Barbarea vulgaris R. Br.	Yellow Rocket	0 **(I)**	2	SB	535
Berteroa incana (L.) DC.	Hoary Alyssum	0 **(I)**	5, 2	B, DF	585, 1006
Brassica rapa L.	Turnip	0 **(I)**	5	DR	603
Cakile edentula (Bigelow) Hooker	Sea-rocket	5	4	B	29
Capsella bursa-pastoris (L.) Medicus	Shepherd's-purse	0 **(I)**	1		^W&T
Cardamine bulbosa Muhl.	Spring Cress	4	2,4	SB, LH	460, 533
Cardamine hirsuta L.	Cardamine	0 **(I)**	1,3	FD	392, 412, 451,
Cardamine pensylvanica Willd.	Cardamine	1	1, 2,4	FD,DF,LH	508, 537, 655
Dentaria laciniata Willd.	Cut-leaved Toothwort	5	3	FD	396
Hesperis matronalis L.	Dame's Rocket	0 **(I)**	4	LH	1001
Lepidium campestre (L.) R. Br.	Pepper Grass	0 **(I)**	2,4	DF	795, 799
Lepidium virginicum L.	Pepper Grass	0	2,3,4	DF,FD	907, 948, 1065,
Nasturtium officinale R. Br.	Watercress	0 **(I)**	1	SB	817
CAMPANULACEAE					
Campanula americana L.	American Bellflower	8	2	LH	76
Lobelia cardinalis L.	Cardinal Flower	7	2	LH	1059
Lobelia kalmii L.	Kalm's Lobelia	10	2	ID	132
Lobelia siphilitica L.	Great Blue Lobelia	4	1	FD	170
CAPPARACEAE					
Polanisia dodecandra (L.) DC.	Clammy-weed	0 **(I)**	1		^W&T
CAPRIFOLIACEAE					
Diervilla lonicera Mill.	Honeysuckle	4	1	FD	1187
Lonicera canadensis Marshall	Fly Honeysuckle	5	2	LH	488
Lonicera dioica L.	Red Honeysuckle	5	2	LH	541
Lonicera japonica Thunb.	Japanese Honeysuckle	0 **(I)**	4	DR	6, 9
Lonicera morrowii A. Gray	Honeysuckle	0 **(I)**	1,2	WD	509,530, 547
Lonicera × *bella* Zabel	Honeysuckle	0 **(I)**	1	FD	529
Lonicera tatarica L.	Tartarian Honeysuckle	0 **(I)**	2	LH	97

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APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Sambucus canadensis L.	Elderberry	3	2	LH	329
Sambucus racemosa L.	Red-berried Elder	3	1	FD	532
Symphoricarpos albus (L.) S. F. Blake	Snowberry	5	1		^W&T
Viburnum acerifolium L.	Maple-leaved Viburnum	6	2	FD	73
Viburnum lentago L.	Nannyberry	4	4	WD	623
Viburnum opulus L.	Highbush Cranberry	5	5	SB	635
CARYOPHYLLACEAE					
Arenaria serpyllifolia L.	Sandwort	0 (I)	5	DF	598
Cerastium fontanum Baumg.	Mouse-Ear Chickweed	0 (I)	2, 5	DR	612, 694
Cerastium semidecandrum L.	Small Mouse-Ear Chickweed	0 (I)	4,5	DF	420, 602
Cerastium tomentosum L.	Snow-in-Summer	0 (I)	2	DR	556
Dianthus armeria L.	Deptford Pink	0 (I)	2	DF	60
Lychnis coronaria (L.) Desr.	Mullein Pink	0 (I)	2	DF	830
Petrorhagia saxifraga (L.) Link	Saxafrage Pink	0 (I)	4	DF	11
Saponaria officinalis L.	Bouncing Bet	0 (I)	2	B	72
Silene antirrhina L.	Sleepy Catchfly	2			^W&T
Silene pratensis (Rafn) Godron & Gren	White Campion	0 (I)	2	DR	685
Silene vulgaris (Moench) Garcke	Bladder Campion	0 (I)	1	DF	806
Stellaria graminea L.	Starwort	0 (I)	2	DF	677, 743
Stellaria media L. Vill.	Common Chickweed	0 (I)	1,5	FD	408, 574
CELASTRACEAE					
Celastrus orbiculata Thunb.	Oriental Bittersweet	0 (I)	5	LH	235, 729
Celastrus scandens L.	Bittersweet	3	2,3	B,LH	26, 53, 716
Euonymus europaea L.	Spindle Tree	0 (I)	2	LH	368
Euonymus obovata Nutt.	Running Strawberry-bush	5	5	LH	639
Euonymus alata (Thunb.) Siebold	Burning Bush	0 (I)	2	LH	964
CERATOPHYLACEAE					
Ceratophyllum demersum L.	Coontail	1	1	SW	660

CHENOPODIACEAE					
Chenopodium album L.	Lamb's Quarters	0 **(I)**	1	DR	1073
Chenopodium hybridum L.	Goosefoot	1			^W&T
Corispermum hyssopifolium L.	Bugseed	3	2	B	1159
Salsola kali L.	Russian Thistle	0 **(I)**	2	ID	1180
CISTACEAE					
Lechea villosa Ell.	Lechea	5	3	DF	1043
CLUSIACEAE (GUTTIFERAE)					
Hypericum kalmianum L.	Kalm's St. John's Wort	10	4	ID	50
Hypericum perforatum L.	St. John's Wort	0 **(I)**	1	DF	807
Hypericum prolificum L.	Shrubby St. John's Wort	5	2	LH	939
Hypericum punctatum Lam.	Spotted St. John's Wort	4	2	SW	1004
Triadenum virginicum (L.) Raf.	Swamp St. John's Wort	10	1	SW	1084
CONVOLVULACEAE					
Convolvulus arvensis L.	Field Bind Weed	0 **(I)**	3	DR	882
Ipomoea pandurata (L.) G. Meyer	Wild Sweet Potato	0 **(I)**	4	DR	1025
CORNACEAE					
Cornus alternifolia L. f.	Pagoda Dogwood	5	2	LH	31, 298
Cornus amomum Miller	Silky Dogwood	2	5	LH	242, 245
Cornus florida L.	Flowering Dogwood	8	5	FD	254
Cornus foemina ssp. *racemosa* (Lam.) J. S. Wilson	Gray Dogwood	1	1,2	DR,LH	2,93
Cornus rugosa Lam	Round Leaved Dogwood	6	4	DR	1097, 1107
Cornus stolonifera Michaux	Red-osier Dogwood	2	1,2,5	SB,LH	542, 599, 813
CRASSULACEAE					
Sedum album L.	White Sedum	0 **(I)**	2	DR	829
CUCURBITACEAE					
Echinocystis lobata (Michaux) T. & G.	Wild Cucumber	2	2	LH	369

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APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
CUSCUTACEAE					
Cuscuta gronovii Shultes	Swamp Dodder	3	1	SW	1048, 1190
DIOSCOREACEAE					
Dioscorea villosa L.	Wild Yam	4	1	FD	977
DIPSACEAE					
Dipsacus fullonum L.	Teasel	0 **(I)**	2	WD	984
ELAEAGNACEAE					
Elaeagnus angustifolia L.	Russian Olive	0 **(I)**	5	DR	732
Elaeagnus umbellata Thunb.	Autumn Olive	0 **(I)**	2	DR	554, 557
ERICACEAE					
Arctostaphylos uva-ursi (L.) Sprengel	Bearberry	8	2,4	B	226, 518
Gaultheria procumbens L.	Wintergreen	5	1	LH	352
Gaylussacia baccata (Wangenh.) K. Koch	Huckleberry	7	1	FD	501
Vaccinium angustifolium Aiton	Low Sweet Blueberry	4	1	LH	1196
Vaccinium corymbosum L.	Highbush Blueberry	6	1	FD, SW	351
Vaccinium pallidum Aiton	Hillside Blueberry	7	1	FD	663, 669, 860, 1085
EUPHORBIACEAE					
Acalyphya rhomboidea Raf.	Three-Seeded Mercury	0	5	SW	1155
Euphorbia corollata L.	Flowering Spurge	4	4	B	1119
Euphorbia dentata Michaux	Toothed Spurge	0 **(I)**	1	DR	1167
Euphorbia maculata L.	Eyebane	0	4	DR	1095
Euphorbia nutans Lag.	Nodding Eyebane	0	2	DR	1041
Euphorbia polygonifolia L.	Seaside Spurge	10	1		^W&T
FABACEAE (LEGUMINOSAE)					
Amphicarpaea bracteata (L.) Fern.	Hog Peanut	5	1	FD	145
Apios americana Medicus	Groundnut	3	4	WD	774, 1143

Coronilla varia L.	Crown Vetch	0 **(I)**	5	DR	790
Gleditsia triacanthos L. f. *inermis* Schneider	Honeylocust	0 **(I)**	4	DR	902
Lathyrus latifolius L.	Everlasting Pea	0 **(I)**	4	DR	881
Medicago lupulina L.	Black Medic	0 **(I)**	1,2	DF	63, 197
Medicago sativa L.	Alfalfa	0 **(I)**	2	DR	1010
Melilotus alba Medicus	White Sweet Clover	0 **(I)**	1	DF	198
Melilotus officinalis (L.) Pallas	Yellow Sweet Clover	0 **(I)**	1	DR	844
Robinia pseudoacacia L.	Black Locust	0 **(I)**	5	B	265
Trifolium pratense L.	Red Sweet Clover	0 **(I)**	2	DF	331
Vicia sativa L.	Spring Vetch	0 **(I)**	2	DF	708
Vicia villosa Roth	Hairy Vetch	0 **(I)**	2	DR	709, 981
Wisteria sinensis (Sims) Sweet	Wisteria	0 **(I)**	3	DR	676, 771
FAGACEAE					
Fagus grandifolia Ehrn.	American Beech	6	5	LH	248
Quercus muhlenbergii Engelm.	Chestnut Oak	5	4	FD	1127
Quercus × *hawkinsiae* Sudw.	Hybrid Oak	4	1	FD	1081
Quercus alba L.	White Oak	5	2	LH,FD	115, 302, 334, 357
Quercus bicolor Willd.	Swamp White Oak	8	6	LH	1193
Quercus rubra L.	Northern Red Oak	5	1	FD	1079
Quercus velutina Lam.	Black Oak	6	1	FD	1080
FUMARIACEAE					
Adlumia fungosa (Aiton) BSP.	Alleghany Vine	4 **(SC)**	1	FD	182
Corydalis sempervirens (L.) Pers.	Pale Corydalis	5	1		^W&T
Dicentra canadensis (Goldie) Walp.	Squirrel-corn	7	1	FD	497
Dicentra cucullaria (L.) Bernh.	Dutchman's Breeches	7	3	FD	394
GENTIANACEAE					
Gentiana andrewsii Griseb.	Bottle Gentian	5	2	LH, WD	229
Gentianopsis crinita (Froel.) Ma	Fringed Gentian	8			^Graff-575
GERANIACEAE					
Geranium maculatum L.	Wild Geranium	4	4,6	LH	426, 434

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Geranium robertianum L.	Herb Robert	3	5	LH	604
GROSSULARIACEAE					
Ribes americanum Miller	Wild Black Currant	6	4	SW	653
Ribes cynosbati L.	Goose Berry	4	6	LH	430
Ribes hirtellum Michaux	Smooth Gooseberry	6	4	LH	802
HALORAGACEAE					
Proserpinaca palustris L.	Mermaid-weed	6	1	SW	346
HAMAMELIDACEAE					
Hamamelis virginiana L.	Witch Hazel	5	1	FD	388
HYDROPHYLLACEAE					
Hydrophyllum appendiculatum Michaux	Great Waterleaf	7	3	FD	573
Hydrophyllum virginianum L.	Virginia Waterleaf	4	5	LH	601
JUGLANDACEAE					
Carya cordiformis (Wang.) K. Koch	Bitternut Hickory	5	1,3	FD	758, 1186
Carya glabra (Miller) Sweet	Pignut Hickory	5	2	LH	1056
Jugans cinerea L.	Butternut	5	1,4	SB,B	816, 903, 1207
Juglans nigra L.	Black Walnut	5	5	SB	1132
LAMIACEAE (LABIATAE)					
Agastache nepetoides (L.) Kuntze	Giant Hyssop	5	1	LH	1162
Clinopodium vulgare L.	Wild Basil	3	1		^W&T
Glechoma hederacea L.	Ground Ivy	0 **(I)**	4	DF	449
Lamium purpureum L.	Dead-nettle	0 **(I)**	1	FD	407
Leonurus cardiaca L.	Motherwort	0 **(I)**	1	DR	843
Lycopus americanus W. P. C. Barton	Water-horehound	2	2	ID	1034, 1074, 1158
Lycopus uniflorus Michaux	Bugleweed	2	2	SW	317, 349
Mentha arvensis L.	Wild Mint	3	5	SW	999, 1153

Mentha spicata L.	Spearmint	0 **(I)**	2	SW	1055
Mentha × *piperita* L.	Peppermint	0 **(I)**	6	WD	1164
Monarda fistulosa L.	Wild Bergamot	2	1	DF	162
Monarda punctata L.	Horsemint	4	4	DR	80
Nepeta cataria L.	Catnip	0 **(I)**	1	DR	846
Physostegia virginiana (L.) Bentham	Obedient Plant	8	4	WD	1144
Prunella vulgaris L.	Heal-all	0	2	DR	840
Scutellaria lateriflora L.	Skull Cap	5	4	LH	1064
Teucrium canadense L.	Wild Germander	4	2	LH	78
LAURACEAE					
Lindera benzoin (L.) Blume	Spice Bush	7	3	FD	400
Sassafras albidum (Nutt.) Nees	Sassafras	5	4	FD	442
LENTIBULARIACEAE					
Utricularia subulata L.	Zigzag Bladderwort	10 **(T)**	2	ID	^2766, MICH
Utricularia vulgaris L.	Bladderwort	6	2	SW	739
LIMNANTHACEAE					
Floerkea proserpinacoides Willd.	False Mermaid	7	3,5	SW	401, 650
LINACEAE					
Linum striatum Walter	Stiff Yellow Flax	10	2	ID	956, 987
LYTHRACEAE					
Decodon verticillatus (L.) Ell.	Swamp Loosestrife	7	1	SW	336
Lythrum salicaria L.	Purple Loosestrife	0 **(I)**		EM	835
MAGNOLIACEAE					
Liriodendron tulipifera L.	Tulip Tree	9	1	FD	194
MALVACEAE					
Malva neglecta Wallr.	Cheeses	0 **(I)**	3	DF	757

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
MENISPERMACEAE					
Menispermum canadense L.	Moonseed	5	4	LH	788
MOLLUGINACEAE					
Mollugo verticillata L.	Carpetweed	0 **(I)**	1		^W&T
MONOTROPACEAE					
Monotropa hypopithys L.	Pinesap	6	1		^W&T
Monotropa uniflora L.	Indian Pipe	8	6	LH	428
MORACEAE					
Morus alba L.	White Mulberry	0 **(I)**	1	DR	839
Morus rubra L.	Red Mulberry	9 **(T)**	1	FD	375, 1112
NYCTAGINACEAE					
Mirabilis nyctaginea (Michaux) MacM.	Wild Four-o-Clock	0 **(I)**	1	DR	1075
NYMPHAEACEAE					
Nuphar advena (Aiton) Aiton f.	Yellow Pond Lily	8	4	SW	921
NYSSACEAE					
Nyssa sylvatica Marsh.	Tupelo	9	1	LH	345, 364
OLEACEAE					
Forsythia sp.	Forsythia	0 **(I)**	3	DR	463
Fraxinus americana L.	White Ash	5	1	LH, FD	223, 233
Fraxinus nigra Marshall	Black Ash	6	4, 5	LH	634, 773
Fraxinus pennsylvanica Marshall	Ash	2	4	LH	88
Ligustrum vulgare L.	Privet	0 **(I)**	2	DR,SW	129,286
Syringa vulgaris L.	Purple Lilac	0 **(I)**	3	DF	467, 468

ONAGRACEAE					
Circaea lutetiana L.	Enchanter's Nightshade	2	1,4	FD	868, 904
Epilobium ciliatum Raf.	Willow-herb	3	1		^W&T
Epilobium coloratum Bieler	Willow-herb	3	4	SB	1122
Epilobium hirsutum L.	Hairy Willow-herb	0 **(I)**	5	SW	992
Ludwigia palustris (L.) Ell.	Water Purslane	4	4	SW	1063
Oenothera pilosella Raf.	Evening Primrose	0 **(I)**	4	DF	7
Oenothera biennis L.	Evening Primrose	2	4	DR	1099
Oenothera clelandii Dietrich, Raven & W. L. Wagner	Cleland's Primrose	7	2,4	LH	211, 925
Oenothera villosa Thunb.	Evening Primrose	4	4	DF	1145
OROBANCHACEAE					
Conopholis americana (L.) Wallr.	Squawroot	10	2	FD	313
Epifagus virginiana (L.) W. P. C. Barton	Beech Drops	10	1	FD	378
Orobanche uniflora L.	Broom-rape	8	3	SB	754
OXALIDACEAE					
Oxalis fontana Bunge	Wood Sorrel	0	1	DR	147
Oxalis stricta L.	Wood Sorrel	0	2	DR	579, 611,820
PAPAVERACEAE					
Chelidonium majus L.	Celandine	0 **(I)**	1	SW	505
Papaver sp.	Cultivated Poppies	0 **(I)**		DF	PHOTO -1208
Sanguinaria canadensis L.	Bloodroot	5	3	FD	397
Stylophorum diphyllum (Michaux) Nutt.	Wood Poppy	10	4	FD	1150
PENTHORACEAE					
Penthorum sedoides L.	Ditch Stonecrop	3	4	WD	1098
PHYTOLACCACEAE					
Phytolacca americana L.	Pokeweed	2	2	LH	117
PLANTAGINACEAE					
Plantago lanceolata L.	Lance Leaved Plantain	0 **(I)**	1,2,5	DR	531, 609, 1070
Plantago major L.	Plantain	0 **(I)**	1	DR	1068

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Plantago rugelli Decne	Rugel's Plantain	0	2	DR	944
PLATANACEAE					
Platanus occidentalis L.	Sycamore	7	3	LH	905
POLEMONIACEAE					
Phlox divaricata L.	Wild Phlox	5	3	LH	562
Phlox paniculata L.	Garden Phlox	0 **(I)**	3	LH	926
POLYGONACEAE					
Polygonum amphibium L.	Water Smartweed	6	1	SW	342
Polygonum aviculare L.	Knotweed	0 **(I)**		DF	980
Polygonum cilinode Michaux	Fringed False Buckwheat	3	4	DF	794
Polygonum convolvulus L.	False Buckwheat	0 **(I)**	1	FD	184
Polygonum cuspidatum Sieb. & Zucc.	Japanese Knotweed	0 **(I)**	1, 4	DR	151, 480
Polygonum hydropiperoides Michaux	Mild Water Pepper	5	1,4	SW	1062, 1083
Polygonum persicaria L.	Lady's Thumb	0 **(I)**	6	WD	1151
Polygonum sagittatum L.	Tear-thumb	5	5,6	WD,SW	1090, 1152
Polygonum virginianum L.	Jumpseed	4	1	LH	86
Rumex acetosella Reichard	Sheep Sorrel	0 **(I)**	2	DF	707
Rumex obtusifolius L.	Bitter Dock	0 **(I)**	1,2	SB,SW	822, 990
Rumex verticillatus L.	Water Dock	7	4	SW	920
PORTULACACEAE					
Claytonia virginica L.	Spring Beauty	4	3	FD	398
Portulaca oleracea L.	Purselane	0	4	DF	1125
PRIMULACEAE					
Lysimachia nummularia L.	Moneywort	0 **(I)**	4	LH	20
Lysimachia terrestris (L.) BSP	Swamp-candles	6	2	SW	933
Lysimachia thyrsiflora L.	Tufted Loosestrife	6	2	SW	738
Lysimachia ciliata L.	Fringed Loosestrife	4	4	LH	91

Samolus parviflorus Raf.	Water Pimpernel	5	4	WD	896
Trientalis borealis Raf.	Starflower	5	1	FD	1072
PYROLACEAE					
Chimaphila maculata (L.) Pursh.	Spotted Wintergreen	8	2	LH	301
Chimaphila umbellata (L.) W. P. C. Barton	Pipsissewa	8	1		^W&T
Pyrola elliptica Nutt.	Shinleaf	6	3	LH	927
Pyrola rotundifolia L.	Shinleaf	7	1		^W&T
RANUNCULACEAE					
Actaea pachypoda Ell.	White Baneberry	7	4	LH	92
Actaea rubra (Aiton) Willd.	Red Baneberry	7	2	LH	545
Anemone cylindrica A.	Gray Thimbleweed	6	1	LH	171
Anemone quinquefolia L.	Wood Anemone	5	6	LH	425
Anemone virginiana L.	Thimbleweed	3	5	LH	289
Anemonella thalictroides (L.) Spach	Rue-Anemone	8	1,2,4	FD	406, 419, 627
Aquilegia canadensis L.	Wild Columbine	5	4	FD	417
Caltha palustris L.	Marsh Marigold	6	6	LH, Creek	422
Caulophyllum thalictroides (L.) Michaux	Blue Cohosh	5	4	LH	416
Clematis virginiana L.	Virgin's Bower	4	1	SB	1086
Coptis trifolia (L.) Salisb.	Goldthread	5	1	FD	W&T
Hepatica acutiloba DC.	Sharp-lobed Hepatica	8	3	FD	404
Hepatica acutiloba × *H. americana*	Hybrid		1	FD	^Wagner
Hepatica americana (DC.) Ker.	Round-lobed Hepatica	6	1	FD	402
Ranunculus abortivus L.	Small-Flowered Buttercup	0	5	LH	646
Ranunculus acris L.	Tall buttercup	0 **(I)**	4	DR	779
Ranunculus hispidus var. *caricetorum* (Green) T. Duncan	Swamp Buttercup	5	4,5	SB	414, 438, 581
Ranunculus recurvatus Poirot	Hooked Crowfoot	5	1,2	LH	551, 626
Ranunculus scleratus L.	Cursed Crowfoot	1	1	SW	659
Thalictrum dioicum L.	Early Meadow-rue	6	1		^W&T
RHAMNACEAE					
Rhamnus cathartica L.	Buckthorn	0 **(I)**	4	WD	893
Rhamnus frangula L.	Buckthorn	0 **(I)**	5	WD	256

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
ROSACEAE					
Agrimonia gryposepala Wallr.	Agrimony	2	3	LH	911
Agrimonia pubescens Wallr.	Soft Agrimony	5	2	LH	983
Amelanchier arborea (Michaux f.) Fern.	Service Berry	4	1	FD	1047
Amelanchier interior Nielson	Service Berry	4	5	LH	251
Amelanchier laevis Wieg.	Service Berry	4	3,4	FD	446, 715
Aronia prunifolia (Marsh.) Rehder	Chokeberry	5			^W&T
Crataegus brainerdii Sarg.	Hawthorn	4	2	SB	1173
Crataegus macrosperma Ashe	Hawthorn	5	2	SB	539
Crataegus sp.	Hawthorn	0 **(I)**	5	FD	595
Duchesnea indica (Andrews) Focke	Indian Strawberry	0 **(I)**	5	DR	617
Fragaria virginiana Miller	Wild Strawberry	2	2,4	DF, ID	432, 534, 700
Geum canadense Jacq.	Avens	1	4	LH	781
Geum laciniatum Murray	Avens	2	1,2	SW	849, 982, 1020
Malus pumila Miller	Apple	0 **(I)**	2,4	LH	441, 575
Malus sieboldii (Regel) Rehder	Japanese Crabapple	0 **(I)**	5	LH	932
Malus sp.	Crab Apple	0 **(I)**	4	DR	444, 447, 448, 452, 453
Physocarpus opulifolius (L.) Maxim.	Nine Bark	4	2	SW	65
Potentilla anserina L.	Silverweed	5	2	ID	696
Potentilla recta L.	Rough-fruit Cinquefoil	0 **(I)**	2	DF	62
Potentilla simplex Michaux	Cinquefoil	2	2	SW	686
Prunus avium (L.) L.	Sweet Cherry	0 **(I)**	5	B	591
Prunus padus L.	Bird Cherry	0 **(I)**	2	LH	632
Prunus pensylvanica L. f.	Pin Cherry	3	4	LH	445
Prunus persica (L.) Batsh	Peach	0 **(I)**		DF	1201
Prunus pumila L.	Sand Cherry	8	1	B	499
Prunus serotina Ehrh.	Wild Black Cherry	2	2,5	LH	558
Prunus virginiana L.	Choke Cherry	2	4	FD	512
Rosa multiflora Murray	Multiflora Rose	0 **(I)**	2	LH	750, 789
Rosa palustris Marsh.	Swamp Rose	5	2	SW	945
Rosa setigera Michaux	Prairie Rose	5	2	SW	946
Rosa sp.	White rose cultivar	0 **(I)**	5	LH	469

Rosa sp.	Cultivated Rose	0 **(I)**	1	DF	808
Rubus allegheniensis Porter	Blackberry	1	1	FD	374
Rubus flagellaris Willd.	Northern Dewberry	1	1,5	LH	592, 613, 625
Rubus hispidus L.	Swamp Dewberry	4	2	LH	938
Rubus occidentalis L.	Black Raspberry	1	4	LH	901
Rubus pensilvanicus Poiret	Yankee Blackberry	2	2	FD	688, 695
Rubus pubescens Raf.	Dwarf Raspberry	4	2	LH	550
Rubus strigosus Michaux	Wild Red Raspberry	2	5	DF	244
Sorbus americana Marsh.	Mountain Ash	4			^W&T
Sorbus aucuparia L.	European Mountain Ash	0 **(I)**	5	DR	593
Spiraea alba Duroi	Meadowsweet	4	3	SW	332, 753
Spiraea tomentosa L.	Steeplebush	5	1	SW	361
Spiraea × *vanhouttei* (Briot) Carr.	Bridal-wreath	0 **(I)**	1	DF	633
RUBIACEAE					
Cephalanthus occidentalis L.	Buttonbush	7	2	SW	108,126
Galium aparine L.	Cleavers	0	3	FD	564, 719
Galium asprellum Michaux	Rough Bedstraw	5	5	SB	842
Galium circaezans Michaux	Bedstraw	4	1,3,4	FD	567, 786, 1067
Galium lanceolatum Torrey	Bedstraw	4	1,4	FD	746, 810
Galium palustre L.	Marsh Bedstraw	3	2	SW	962
Galium pilosum Aiton	Hairy Bedstraw	6	4	FD	950, 1121,1131
Galium tinctorium L.	Bedstraw	5	2	LH	311
Galium triflorum Michaux	Bedstraw	4	1	FD	971
Mitchella repens L.	Partridgeberry	5	1	FD	811
RUTACEAE					
Ptelea trifoliata L.	Hoptree	4	4	B	4,5
SALICACEAE					
Populus balsamifera L.	Balsam Poplar	2	1,4	B,DF	51, 156
Populus deltoides Marsh.	Cottonwood	1	1	DF	519
Populus grandidentata	Big-tooth Aspen	4	2	DF	710, 749
Populus nigra var. *Italica* L.	Lombardy Poplar	0 **(I)**	1	DF	177
Populus tremuloides Michaux	Quaking Aspen	1	1	SW edge	506

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Salix babylonica L.	Weeping Willow	0 **(I)**	2	SB	828
Salix bebbiana Sarg.	Bebb's Willow	1	4	WD	458
Salix cordata Michaux	Dune Willow	10	4	B	514
Salix discolor Muhl.	Pussy Willow	1	2,4	SW	391, 456
Salix eriocephala Michaux	Heart-leaved Willow	2	1,2,4,5	SB,SW	459,474, 473, 483, 502
Salix exigua Nutt.	Sandbar Willow	1	4,5	SB	485, 486, 582
Salix lucida Muhl.	Shining Willow	3	2	SW	319
Salix myricoides Muhl.	Blueleaf Willow	9	2,4,5	SW,B,D	457, 515, 586, 596
Salix nigra Marsh.	Black Willow	5	2,5	SW	587
Salix petiolaris J. E. Smith	Slender Willow	1	2,4	SW, WD	484, 510, 576
Salix purpurea L.	Purple Willow	0 **(I)**	5	SB	584
Salix serissima (Bailey) Fern.	Autumn Willow	8	5		259, 276
SANTALACEAE					
Comandra umbellata (L.) Nutt.	Bastard-toadflax	5	1		^W&T
SAURURACEAE					
Saururus cernuus L.	Lizard's Tail	9	2	SW	943
SAXIFRAGACEAE					
Mitella diphylla L.	Mitrewort	8	1	FD	498, 526
Tiarella cordifolia L.	Foam Flower	9	1	FD	1049
SCROPHULARIACEAE					
Chelone glabra L.	Turtlehead	7	2	SW	1172
Melampyrum lineare Desr.	Cow-wheat	6	1	FD	1029
Mimulus ringens L.	Monkey-Flower	5	5	EM	1000
Pedicularis canadensis L.	Wood Betany	10	4	FD	436
Verbascum blattaria L.	Moth Mullein	0 **(I)**	1	DR	845
Verbascum thapsus L.	Mullein	0 **(I)**	2	DF	
Veronica arvensis L.	Field Speedwell	0 **(I)**	4	DF	674
Veronica serpyllifolia L.	Thyme-leaved Speedwell	0	3	DF	675

SIMAROUBACEAE					
Ailanthus altissima (Miller) Swingle	Tree-of-Heaven	0 **(I)**	1	FD	199
SOLANACEAE					
Physalis heterophylla Nees	Clammy Ground Cherry	3	1	DF	861
Solanum carolinense L.	Horse Nettle	0 **(I)**	4	DR	930
Solanum dulcamara L.	Bittersweet Nightshade	0 **(I)**	2	LH	104
Solanum nigrum L.	Black Nightshade	1	1	FD	188
STAPHYLEACEAE					
Staphylea trifolia L.	Bladdernut	9	4	FD	949
THYMELAEACEAE					
Dirca palustris L.	Leatherwood	8	1	FD	379
TILIACEAE					
Tilia americana L.	Basswood	5	3,5	LH, FD	717, 1002
ULMACEAE					
Celtis occidentalis L.	Hackberry	5	5	LH	281
Ulmus americana L.	American Elm	1	4	LH	657
Ulmus pumila L.	Siberian Elm	0 **(I)**	1	DR	1202
Ulmus rubra Muhl.	Red Elm	2	1,5	FD	560
URTICACEAE					
Boehmeria cylindrica (L.) Sw.	False Nettle	5	2	SW	106, 128
Laportea canadensis (L.) Wedd.	Wood Nettle	4	5	LH	651
Pilea pumila (L.) A. Gray	Clearweed	5	4	LH	654
Urtica dioica ssp. *gracilis* (Aiton) Selander	Stinging Nettle	1	4	LH	871
VERBENACEAE					
Phryma leptostachya L.	Lopseed	4	2	FD, LH	74, 157
Verbena bracteata Lag. & Rodr	Creeping Vervain	0 **(I)**	1		^W&T
Verbena hastata L.	Blue Vervain	4	1	SW	1019

(Continued)

APPENDIX 1. Continued

Latin Name	Common Name	C Value* (Status**)	Loc.***	Habitat****	Collection No.^
Verbena urticifolia L.	White Vervain	4	2	SB	991
Verbena × *engelmannii* Moldenke	Verbena hybrid	4	4	WD	1147
VIOLACEAE					
Viola rostrata Pursh	Long-spurred Violet	6	1	FD	493
Viola canadensis L.	Canada White Violet	5	3	FD	565
Viola cucullata Aiton	Marsh Violet	5	4	SB	461
Viola odorata	Sweet Violet	0 (**I**)	4	LH	413
Viola pubescens Aiton	Yellow Violet	4	6	LH	424
Viola rostrata Pursh	Long-spurred Violet	6	4,6	LH	423, 433
Viola sororia Willd.	Common Blue Violet	1	3	FD	572
VITACEAE					
Parthenocissus quinquefolia (L.) Planchon	Virginia Creeper	5	5	WD	238
Vitis aestivalis Michaux	Summer Grape	6	1	FD, DF	8, 185
Vitis labrusca L.	Fox Grape	7	1,4	FD,LH	776, 809
Vitis riparia Michaux	Riverbank Grape	3	2	B	52, 704
Vitis vulpina L.	Frost Grape	8 (**T**)	4	SB,DR	1094, 1106

* Coefficient of Conservatism (described in Methods)
** Status: **FT** = Federally Threatened; **T** = State Threatened; **SC** = State Special Concern; **I** = Introduced species
*** Location Codes refer to Figure 2
**** Habitat Codes refer to Figure 3
^ All collection numbers deposited at AUB and collected by the author 2004-2005, unless otherwise indicated as follows: Graff collected by A. Graff 1993-1994 (AUB); W&T= reported by Wells & Thompson, 1979; Wagner = reported by Wagner, 1979; MNFI = reported by Michigan Natural Features Inventory database. PHOTO -photo voucher only

DAPHNE MEZEREUM L. (THYMELAEACEAE) IN WISCONSIN

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The introduction of "invasive alien species" (IAS) has and continues to cause substantial changes and disruptions to ecosystems worldwide (Elton 2000; Wilcove et al. 1998; Wilson 1992). The globalization of species, that is, the spread of other species throughout the world by human activities, is exacerbated by the flourishing trade of a globalized economy (Meyer 2005). Davis (2003) summarizes the conclusions of others when he states: "The globalization of Earth's biota is transforming local and regional floras and faunas." Clout and Poorter (2005) concur that IAS are a major threat to biological diversity on a global scale, and to prevent plant invasions requires international cooperation.

Although there is no evidence that even one native plant species has been driven to extinction, or even extirpated within a single U.S. state due to IAS (Davis 2003), researchers acknowledge that it may require many years before an established alien rapidly expands its range and abundance at the expense of local biological communities (Clout & Poorter 2005).

This report addresses one potentially IAS, *Daphne mezereum,* which was recently documented in Vilas County, Wisconsin (bordering Michigan Upper Peninsula). *Daphne*, a shrubby genus of temperate Europe and Asia, is represented by 70 species (Gleason & Cronquist, 1991). Considerable numbers of these, including *D. mezereum* L., are cultivated for their attractive, fragrant flowers, and in some species, evergreen leaves (Bailey Hortorium Staff 1976).
D. mezereum is a low-growing (one meter) deciduous shrub that flowers in early spring (March or early April), before the new leaves have expanded, hence the common name from Europe, February Daphne. The precocious flowers arise on tiny branches from the axillary buds of the previous year's leaves. The stem continues to grow from the terminal bud, such that the brilliant red fruits are below the leafy stems of the current season.

The plant is poisonous in all its parts, but human poisoning is mostly traced to ingestion of the fruit and seeds (Lampe & McCann 1985). Exposure to the skin can result in minor and short-lived irritation. Lewis and Elvin-Lewis (2003) state that it is "fatal to humans; burning of throat and stomach, internal bleeding, weakness, coma, and death; the [diterpene] mezerein also carcinogenic in animals."

The specific epithet, *mezereum,* is from the medieval name Mezereum, derived from the Persian *Mazariyun*, a name given to a species of *Daphne* (Grieve, n.d.). *D. mezereum* shares a long history with humans, reported to have been in cultivation in Eurasia since 1561 (Rehder 1940). The plant is well-adapted to

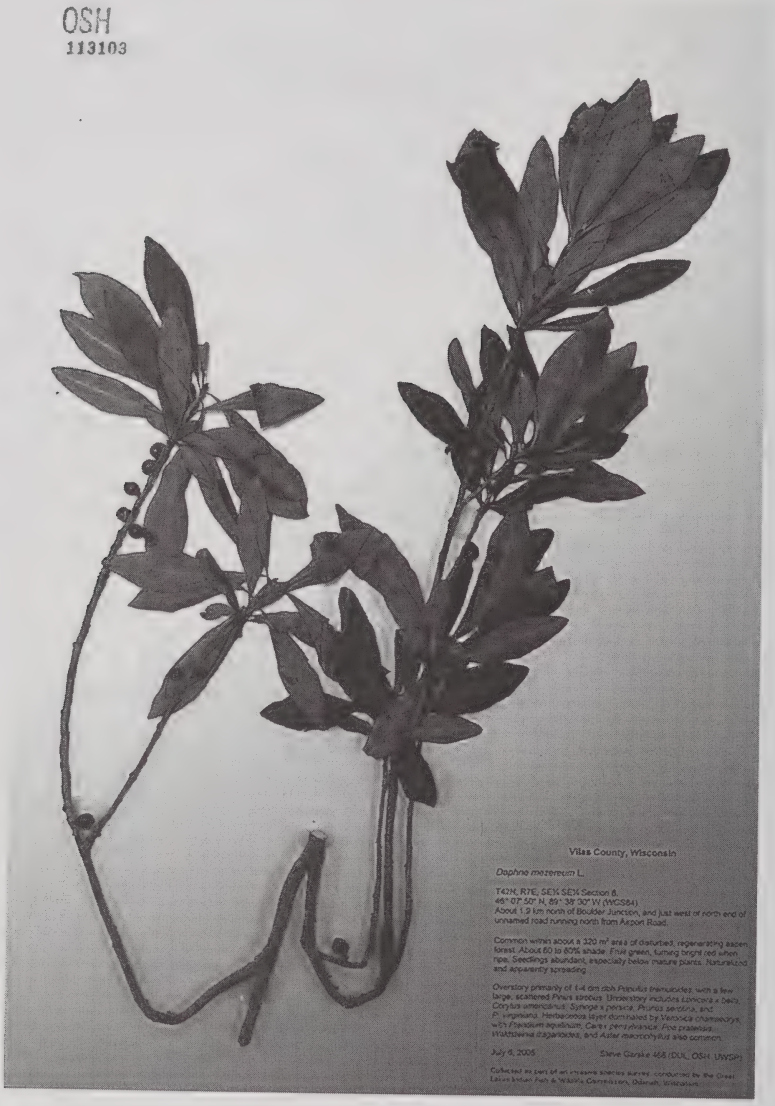

FIGURE 1. Daphne mezereum voucher from OSH (photo by the author)

temperate climates—in North America *D. mezereum* is successfully cultivated within growing zone 3 (–40 to –34°C).

D. mezereum has long been present as an escape in New England and adjacent Canada. It first appears as a garden escape in Gray (1889): "Escaped from cultivation in Canada, Mass., and N. Y." In the previous edition (Gray 1868), it is only mentioned as being in cultivation, and no comment as to its becoming

naturalized is offered in the Addenda segment, dated January, 1868, where a number of other such "weed reports" are given. Its weedy tendencies are mentioned in Webb and Ferguson (1968). " . . . often cultivated for ornament and . . . occasionally naturalized by bird-dispersal." Indeed, *D. mezereum* is identified as a "potentially invasive species" in Canada where the plant is established in moist forests of southern Ontario (Havinga, 2000), while presently in the U.S. it is recognized as invasive only in certain regions of Massachusetts (Swearingen, 2005).

Based on a July 2005 collection by Steve Garske, Education Specialist/Invasive Plant Aide, *D. mezereum* appears naturalized in west central Vilas County and can be included as part of the state flora. A voucher specimen of *D. mezereum* that was donated to OSH represents a state record bearing the accession number 113103 (Figure 1). Duplicate vouchers are housed at UWSP and DUL.

Garske discovered the *D. mezereum* population approximately 1.9 km north of the city of Boulder Junction (Boulder Junction Township) during an invasive species survey conducted on behalf of the Great Lakes Indian Fish & Wildlife Commission. The range and township location for the *D. mezereum* site is R7E, T42N, SE¼ SE¼ Section 8, while the latitude/longitude coordinates are 46E 07′ 50″ N, 89E 38′ 30″ W (WGS84).

According to Garske (Personal email communication, 16 February 2006), the population is established outside cultivation, occupying an area of approximately 320 m^2 beneath disturbed, regenerating aspen forest. Seedlings are reported abundant, especially below mature plants beneath a canopy shading 60-80% of the groundlayer.

Garske explained that a Boulder Junction resident informed him that in the early 1900s a local man who was a "horticulturalist" imported "all kinds of things to grow" near the plant collection site. In fact, Garske was shown a plant of *D. mezereum* on the man's lake house property, which presumably is descended from the original planting done there in the early 1900s. Garske speculates that the patch he discovered nearby may possibly have been introduced and since spread, appearing naturalized as a small isolated copse.

Given the IAS potential of *D. mezereum,* Garske recommends (and this author concurs) that the naturalized patch of *D. mezereum,* as well as other IAS present at the site, *Lonicera* × *bella* and *Veronica chamaedrys*, be eradicated sooner rather than later. Apart from prevention, which isn't an option in this circumstance, a modest eradication effort may be the next best method for aiding protection of the integrity of the local Boulder Junction flora in Vilas County.

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REVIEW

Dickmann, Donald I. and Larry A. Leefers. 2003. The Forests of Michigan. xii + 297 pp. Paperback, ISBN 0-472-06816-4, $22.95; cloth, ISBN 0-472-09816-0, $50.00. University of Michigan Press, Ann Arbor; www.press.umich.edu

From the title, I was expecting a detailed ecological discussion about the various forest communities of Michigan. And that's here, but lightly done. What we have in fact is a most lively history of Michigan from the perspective of forests and forestry. Hardly any politicians are mentioned, and the dates are markers for when certain fires occurred, when certain lumbering activities began, and so on. The book is a very readable treatise on human [mis]behavior.

There is a bit of sermonizing, but it's not unwelcome. It's necessary, because even a landscape as ill-treated as this one does recover, and what one sees today looks "normal," until you've read this book and learned what the countryside used to be. Just as the preacher ends with "Go thou and sin no more," then by the same token the book wraps up a tale of unrelieved horror with the efforts we make today in fire protection, careful tree-harvesting procedures, and protection of public lands in state and federal forests. The history of the contributions made by the Depression-era Civilian Conservation Corps is especially interesting.

The comments above refer particularly to Chapter 6, "The Plunder of Michigan's Pineries." Read this chapter if you don't read anything else in the book.

Chapter 4 is another thing entirely: "Forests and the Native People of Michigan." There's a great deal on the birch-bark canoe, and not a word too many. There's also a brief discussion (p. 79) of the uses of sweet grass, *Anthoxanthum odoratum*, by Native Americans. Somebody led the authors astray here, because this species is an adventive from Europe, and what was meant was *Hierochloë odorata*, a spring-flowering native grass at the edges of woods. They both smell sweetly of coumarin.

There's an ample index, so you can get back to the references to prostitution in the lumbering camps. But the index includes directly no scientific names. If you look under "grass, sweet (*Anthoxanthum odoratum*), 79," you will find the reference. Note that all the tree species are handled the same way: "aspen, trembling" but no "trembling aspen," and no direct entry for "*Populus tremuloides.*"

The authors are Professors of Forestry at Michigan State University, and it is appropriate that the book be dedicated "To foresters." It might also have been dedicated "To lovers of well-written history."

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EDITOR'S NOTE: 44 YEARS OF PROGRESS

As I begin my tenure as Editor of *The Michigan Botanist*, I will reflect briefly on the journal's past and draw your attention to a few points of relevance for the short term future. The history of the journal is an illustrious one filled with contributions of all sorts ranging from ecology to pathology. Because of the papers published in *The Michigan Botanist* since 1962, we now know about the flora of Long Point, Ontario, Sleeping Bear Dunes, Michigan, The Apostle Islands, Wisconsin, and more than 40 other areas. We also have a key to the violets of Michigan and other genera as well as a compendium of the nature preserves in Michigan. Over the last 44 years, *The Michigan Botanist* has also published several new species descriptions and many ecological studies of the vegetation around us. We have also seen numerous reports of exotic species that have invaded the Great Lakes area and read biographies of many of the great botanists that have contributed to our knowledge of plants in this region. Thus, *The Michigan Botanist* serves as the premiere journal from which we have all come to learn of botany in the Great Lakes region. Yet, in spite of 44 years-worth of progress, there are still numerous areas that require inventory, seed germination requirements that need attention, and pollinators that require documentation!

As we embark on publication of the next 44 years of the journal there are a few notifications for contributors. Updated instructions to authors are printed on the inside back cover of this issue for contributors to follow. Only a brief set of instructions is provided because the journal is flexible with regard to formatting of contributions. We prefer that authors worry more about content than formatting because the typesetter can handle nearly all file types. However, there are a few new requirements for submitted manuscripts. First, all papers need to provide an abstract that summarizes the manuscript and provide up to 5 keywords. This is necessary for all contributions except "Noteworthy Collections" (see below), items of "The Big Trees and Shrubs of Michigan" project or any other short contribution for which an abstract would be superfluous. Second, voucher specimens must be cited for floristic works or other relevant studies. Thus, papers citing plant records without documenting vouchers are generally not acceptable. Third, manuscripts dealing with brief reports of significant plant collections should all be formatted as "Noteworthy collections" as was initiated in 1988 (volume 27(3) p. 90). This section is particularly useful for documenting new occurrences in the flora of the Great Lakes region. As previously established, papers in this section will be reviewed and a voucher specimen must be deposited in a public herbarium. Finally, a "Letters to the Editor" section will be instituted as a new feature in *The Michigan Botanist*. These contributions are intended to raise awareness of issues of importance to Great Lakes botany. They could offer perspectives about conservation, taxonomy, or other timely issues to draw the attention of readers to important topics. Any "Letter to the Editor" should be brief and justify points with relevant citations. These letters will be critically reviewed and will only be published if found to convey important points of general interest. Letters of a purely political nature and those with unsubstantiated claims are not acceptable.

——Todd J. Barkman

INSTRUCTIONS TO AUTHORS

1. Create text in 12-point Times New Roman font and double space paragraphs throughout. Papers should be organized as follows: Title, Author(s) and address(es), Abstract with up to 5 keywords, Introduction, Materials and Methods, Results, Discussion, Acknowledgements, Literature Cited, Tables, Figure Legends, and Figures. Sections may be omitted if not relevant. All pages should be numbered. Please contact the editor regarding any questions related to formatting.

2. For noteworthy collections, manuscripts should be formatted as described in *The Michigan Botanist*, volume 27(3) p. 90. A brief description of the formatting follows. The following title, "Noteworthy collections", should begin each submitted manuscript followed on the next line by the State or Province for the species reported. The next line should list the taxon of interest using the following format: *Species* Author(s) (Family). Common name. The rest of the manuscript should include the following named sections: Previous knowledge, Significance of the report, Diagnostic characters (if desired), Specimen citations, and Literature cited. Each of these sections are largely self explanatory; however, "specimen citations" should include the relevant label data from the voucher specimen(s) including location data, collector(s), collection number, etc. Also please include which herbarium the specimen(s) is deposited in using the Index Herbariorum acronym. The manuscript should end with the name and address of the author(s).

3. Letters to the Editor can be formatted as general text without the specific sections listed above. However, literature cited and any tables or figures should be formatted as described below.

4. Please create tables using either a tab delimited format or a spreadsheet using Excel or other similar program. Each table is to be submitted as a separate file. Table captions should be placed at the top of the table. Any footnotes should appear at the bottom of the table. Please do not insert tables within the body of the text.

5. Send each figure as a separate file in a high-resolution format—eps, jpg, or tif. Figures like bar graphs that gain their meaning with color won't work—use coarse-grained cross-hatching, etc. Create figure legends as a separate text file, and the typesetter will insert them as appropriate. Please DO NOT insert the figure in the body of the text file.

6. Citations: Please verify that all references cited in the text are present in the literature cited section and vice versa. Citations within the text should list the author's last name and publication year (e. g. Smith 1990). For works with more than 2 authors, use "et al.", and separate multiple citations with a semicolon.

7. Literature Cited: List citations alphabetically by author's last name. Author names are to be listed with surname first, followed by initials (e. g. Smith, E. B.). Separate author's initials with a single space. The year of publication should appear in parentheses immediately before the title of the citation. The entire journal name or book title should be spelled out. Please put a space after the colon when citing volume number and page numbers.

8. Italicize all scientific names. Voucher specimens must be cited for floristic works or any other relevant study. Papers citing plant records without documenting vouchers are generally not acceptable.

9. Manuscripts may be submitted electronically to the email address of the editor. Printed versions of manuscripts may also be submitted in which case three copies should be provided. All manuscripts will be reviewed by at least two referees. A more complete set of instructions is available at http://www.michbot.org/publications/Botanist/instruct_authors.htm.

CONTENTS

On the cover: Orchis spectabilis *(Showy Orchis), a state-listed threatened species, photographed in May 2005 in a lowland hardwood forest at Warren Dunes State Park, Berrien County, MI.*

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For all inquiries about back issues and institutional subscriptions please contact Linda Reece, The Michigan Botanist Business Office, Andrews University, Biology Department—216 Price Hall, Berrien Springs, MI 49104; 269. 471. 3243 (Phone), 269. 471. 6911 (FAX); reecel@andrews.edu.

THE MICHIGAN BOTANICAL CLUB

Membership is open to anyone interested in its aims: conservation of all native plants; education of the public to appreciate and preserve plant life; sponsorship of research and publication on the plant life of the state and the Great Lakes area in general, both in the USA and in Canada; sponsorship of legislation to promote the preservation of Michigan's native flora; establishment of suitable sanctuaries and natural areas, and cooperation in programs concerned with the wise use and conservation of all natural resources and scenic features.

Dues are modest, but vary slightly among the chapters. To become a chapter member please contact the chapter presidents listed below. "Special Members" (not affiliated with a chapter) may send US$21 to Irene Eiseman, MBC Special Membership Chairperson, 1873 Pierce Road, Chelsea, MI 48118, 734. 475. 9654. For both classes of membership, annual dues include a subscription to *The Michigan Botanist*. Address changes for Chapter Members should go to the Chapter President; address changes for Special Members should go to Irene Eiseman.

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THE BIG TREES AND SHRUBS OF MICHIGAN

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ABSTRACT

The history and development of Michigan's Big Tree and Shrub Program is described. Specifications are given on how to measure and report potential champion-sized trees and shrubs. A list of 678 individual trees and shrubs is presented along with their measurements and locations. State and current and former National Champions are designated. An additional list sorted by counties is presented. Some of these trees and shrubs haven't been re-measured for many years. Readers are urged to become active in visiting and re-measuring them.

INTRODUCTION

This paper presents a revision and expansion of "The Champion Trees and Shrubs of Michigan," published in *The Michigan Botanist* (vol. 42, #1, pp 3–46) in 2003. Many changes have occurred in the lists of Champion Trees and Shrubs since that paper was published. Additional species have been included, new champions have been found, and, regrettably, some of our fine former champions have been lost to ice and wind storms, lightning strikes, road commissions, and development.

The 2003 list contained 81 genera, 217 species and varieties, and 252 items. The list presented herein contains 86 genera, 298 species and varieties, and 678 items. The additional species and varieties are largely the result of Robert Bloye's study of the trees of the Michigan State University campus in East Lansing, Stu Bassett's studies at the Kellogg Biological Station near Gull Lake in Kalamazoo County, Jeff Boddy's studies at Leila Arboretum in Battle Creek in Calhoun County, along with those of Richard Pomorsky, Gail McPherson and others who contributed to the annual Big Tree Hunt sponsored by Global ReLeaf of Michigan. Since 2003, the author has measured 49 champion and sub-champion trees, all of which are included here, plus many others that were too small to be included.

Much of the material in the next several paragraphs has appeared in *The Michigan Botanist* in earlier versions of this paper. They are repeated here, and in some cases expanded, so as to be available to Michigan Botanical Club members and others who take this paper into the field when searching for big trees and shrubs. Reducing all this to a literature citation wouldn't be of much use to them when they are in the field.

The very large increase in the total number of items is due to the decision to include most of the "Michigan Big Tree and Shrub Inventory." This list of 953 trees first put together in 1997 was not published previously because the database on which it was built contained too many errors. In the intervening years, I have culled many of these and deleted some data from old records. Trees reported in many of the old records most likely no longer exist. Errors certainly remain in this larger list. Data were available on 1132 trees, but 445 have been excluded. I entrust this list to the members of the Michigan Botanical Club to make additional corrections, additions, and deletions over time.

American Forests is also taking steps to "clean up" the *National Register of Big Trees.* Eventually, they want to exclude all National Champions that haven't been re-measured in the last ten years. They are beginning by asking for re-measurement of all National Champions that haven't been re-measured since 1980. This will be an ongoing challenge for Michigan since we have over 50 National Champions on their list. Many of these have not been visited or re-measured in the last ten years. Anyone willing to help with this work is urged to contact me for whatever locational data I might have. Whenever possible, GPS data have been recorded for trees measured during the last few years. The GPS coordinates should enable anyone with a GPS unit to locate these trees anywhere in the state within 30 feet.

American Forests has published the *National Register of Big Trees* since the 1940s with the support of the Davey Tree Expert Company and State Coordinators in each of the states. As *American Forests* is organized the big tree work comes under the Global ReLeaf part of the organization. Its purposes are to raise awareness of the importance of trees in our lives, raise funds to plant trees in many parts of the planet, including Michigan, and record just how big some of our woody species can get to be. Global ReLeaf has also recently produced software through which a community can analyze the percent tree cover in both towns and rural areas.

Some woody species get to be very large under the forces of genetics and natural selection. All plants that share ecosystems are competing for light, water, nutrition and space. There are winners and losers in this competition. Besides genetics and natural selection some members of a species get to be very large and others don't due to the vagaries of logging, slope, location, fire and drought. The best information on how large a species can get to be is contained in the *National Register of Big Trees* and state reports such as the one published here. Every year still bigger examples are found and previous champions are lost. To keep up with these changes, the *National Register of Big Trees* is published every two years, the Michigan list every three years in recent times.

The Big Tree Program of the Michigan Botanical Club started soon after the organization of the club in 1941. Paul Thompson, affiliated with the Cranbrook Institute of Sciences, became the state's Big Tree Coordinator and served in that capacity for over forty years until his death in 1994. Many individuals, mostly Michigan Botanical Club members, worked with Paul over the years as he set about discovering, measuring, and recording Michigan's biggest trees and shrubs. Champion size trees were reported to *American Forests*, nominated for National Champion status, and subsequently listed in the *National*

Register of Big Trees, issued every two years by *American Forests*. The Michigan list of State Champions continues to evolve and expand. For an earlier record which will facilitate comparison with the current list see Thompson (1975 and 1986).

I began my work with Paul Thompson in 1991. We had decided to prepare a series of short articles for publication in *The Michigan Botanist*. Paul described trees he thought I could find, gave me careful directions to their locations, and I began a new set of measurements. About two dozen trees had been located and re-measured before his death in 1994. The series of articles in *The Michigan Botanist* has continued to grow. As of the October, 2005 issue, 49 have been published and another sixteen have been submitted. These articles are described in the next section of this paper and listed in Table 1.

Paul Thompson had an amazing ability to recall instantly a great many details about each champion tree or shrub and its location. He enjoyed telling me whether the approach road was paved or gravel, whether the farmhouse the tree stood beside had bay windows or not, and, oh yes, "There is a woodpecker hole on the northeast side of the trunk." When I learned of his death, I feared that all of this had been lost. Much of it has been, of course, but not all. Through the kindness of his family and the efforts of friends, George and Kathleen Thomson (no relation to Paul), his meticulous and voluminous notes were preserved. The notes contained information on 3734 individual trees and shrubs in Michigan. In some cases, the measurements were exact and the locations were precise. In other cases, measurements were approximations and locations were described only in cryptic hints.

Sorting through Paul Thompson's records took 2½ years. That work resulted in *The Michigan Botanist* series of articles, and the 1997 paper updating Paul's 1994 list of champions, published as Ehrle (1997). Based on Paul Thompson's records, the four or five largest of each species were entered into a computer database known as the "Michigan Big Tree and Shrub Inventory." The 227 items in the 1997 list of champions were subsets extracted from the larger database. The database has been updated periodically. The most recent update provided the information for this paper.

Native and non-native species have been included in the Michigan lists from the beginning of the big tree work in the state in order to make the lists as inclusive as possible. The *National Register of Big Trees* includes native and "naturalized" species with the definition of naturalized continuing to evolve over time. Then again, they include the Giant Saguaro Cactus as a "tree or shrub" which perplexes some non-desert people.

Paul Thompson and the people who worked with him discovered many of the champions and sub-champions included in the database. Through their efforts, at one time Michigan had more recorded National Champions standing within its borders than most other states. This paper is dedicated to the memory of Paul Thompson and in salute to his outstanding contributions to Michigan botany and to the Michigan Botanical Club.

THE MICHIGAN BOTANIST BIG TREE ARTICLES

With the agreement of the editor of *The Michigan Botanist* and the endorsement of the Michigan Botanical Club Board of Directors, a series of articles on Michigan's big trees was started in *The Michigan Botanist* in 1992 (see Table 1). Each article provides a description and illustration of the species along with the location of the champion, directions on how to reach it, and its most recent measurements. Consulting these papers before going out to search for a particular tree can be a useful time saver. The third paper in this series reports on a tree that has since been lost in a storm. Reprints of these articles are available from Elwood B. Ehrle.

HOW TO MEASURE AND REPORT A BIG TREE

National and State Champion status is based on a point system. The number of points is obtained by adding the circumference of the trunk, in inches, 4½′ above the ground to the height in feet and ¼ of the average crown spread in feet. Trees or shrubs that are within 5 points of one another are considered to be co-champions.

The circumference of the trunk is usually the easiest measurement to make. A tape can be run around the trunk at 4½′ above the ground or a string can be used if a long tape is not available. In situations where the tree grows on a steep slope, there may be some uncertainty as to just where on the trunk 4½′ comes. In these cases, it is best to measure the circumference at 4½′ on both the up-slope and down-slope sides and average them together. If a tree trunk branches below 4½′, the least circumference between 4½ feet and the ground should be measured. The height is best determined by using a clinometer, Abney Hand Level, transit, or other instrument for measuring the angle formed by sighting the base and top of the tree. If this angle is measured 100′ from the tree, a table of tangents can be used to convert the number of degrees of the angle to the height of the tree in feet. Some modern clinometers, besides providing the angle from base to top, will also provide the height as a percentage of the distance from the tree. This feature is most useful in association with a laser range finder to measure the distance to the tree. If instruments to measure the angle, are not available a straight stick can be used by backing away from the tree to measure its height. Hold the stick at arm's length while backing away from the tree. When far enough from the tree to sight over the hand holding the stick to the base of the tree and over the top of the stick to the top of the tree, you are at a distance from the tree equal to the height of the tree. For this to be accurate, you must be on ground level with the tree base.

There are several other more or less reliable methods of measuring the heights of trees. If a tree stands alone and casts a shadow on a sunny day, the length of the shadow can be measured and compared to the shadow cast by a yardstick. For instance, if the yardstick (3′) casts a 6′ shadow (each foot of the yardstick casts a 2′ shadow) and the tree casts a 120′ shadow, the height of the

TABLE 1. The Michigan Botanist Big Tree Articles Thus Far Published

Article #	Mich. Bot. Volume Page & Year
1. Populus balsamifera L. Balsam Poplar	31: 112–114 (1992)
2. Populus tremuloides Michx. Quaking Aspen	32: 232–234 (1993)
3. Quercus bicolor Willd. Swamp White Oak	32: 266–268 (1993)
4. Pinus banksiana Lamb. Jack Pine	33: 19–21 (1994)
5. Pinus resinosa Ait. Red Pine	33: 69–71 (1994)
6. Magnolia acuminata (L.) L. Cucumber Tree	33: 91–93 (1994)
7. Quercus alba L. White Oak	33: 125–127 (1994)
8. Quercus rubra L. Red Oak	34: 79–81 (1995)
9. Ginkgo biloba L. Ginkgo	34: 133–134 (1995)
10. Tilia americana L. Basswood	34: 141–143 (1995)
11. Fraxinus pennsylvanica Marsh. Red Ash	34: 144–146 (1995)
12. Morus rubra L. Red Mulberry	34: 147–149 (1995)
13. Quercus macrocarpa Michx. Bur Oak	35: 27–29 (1996)
14. Gleditsia triacanthos L. Honeylocust	35: 51–53 (1996)
15. Populus deltoides Marsh. Cottonwood	35: 54–56 (1996)
16. Salix nigra Marsh. Black Willow	35: 96–98 (1996)
17. Pinus nigra var. austriaca (Hoess.) Aschers. Black Pine	35: 99–101 (1996)
18. Fraxinus americana L. White Ash	36: 119–120 (1997)
19. Acer platanoides L. Norway Maple	36: 121–123 (1997)
20. Ostrya virginiana (Miller) K. Koch Ironwood or Hop–hornbeam	37: 14–16 (1998)
21. Castanea dentata (Marsh.) Bork. American Chestnut	37: 59–61 (1998)
22. Fagus grandifolia Ehrh. American Beech	37: 62–63 (1998)
23. Acer saccharum Marsh. Sugar Maple	37: 117–119 (1998)
24. Taxodium distichum (L.) Rich. Bald-cypress	38: 42–44 (1999)
25. Sequoiadendron giganteum (Lindl.) Buckholz Giant sequoia	38: 45–47 (1999)

(Continued)

TABLE 1. The Michigan Botanist Big Tree Articles Thus Far Published

Article #	Mich. Bot. Volume Page & Year
26. Acer pseudoplatanus L. Sycamore Maple	39: 51–52 (2000)
27. Prunus pensylvanica L.f. Pin Cherry	41: 13–14 (2002)
28. Salix koidzuna f. tortuosa Rehder Corkscrew Willow	41: 15–17 (2002)
29. Betula papyrifera Marsh. var. cordifolia (Regel) Fern. Mt. Paper Birch	41: 94–96 (2003)
30. Betula pendula Roth. European White Birch	41: 97–99 (2003)
31. Acer saccharinum L. Silver Maple	41:101–103 (2003)
32. Platanus occidentalis L. Sycamore	41:104–106 (2003)
33. Picea abies(L.) Kartsten Norway Spruce	42: 47–49 (2003)
34. Quercus schumardii Buckley Southern Red Oak	42:161–162 (2003)
35. Fraxinus profunda (Bush) Bush Pumpkin Ash	43: 38–40 (2004)
36. Syringa vulgaris L. Common Lilac	43:128–130 (2004)
37. Diospyros virginiana L. Common Persimmon	43:131–132 (2004)
38. Catalpa bignonioides Walter Southern Catalpa	43:133–136 (2004)
39. Morus alba L. White Mulberry	43:379–381 (2004)
40. Asimina triloba (L.) Dunal Pawpaw	43:399–400 (2004)
41. Quercus meuhlenbergii Chinkapin Oak	43:421–422 (2004)
42. Quercus bicolor Swamp White Oak	43:423–424 (2004)
43. Magnolia ×soulangeana Soul. Saucer Magnolia	44: 9–11 (2005)
44. Sassafras albidum (Nutt.) Nees Sassafras	44: 75–77 (2005)
45. Juniperus virginiana L. Eastern Redcedar	44:105–108 (2005)
46. Pseudotsuga menziesii (Mirbel) Franco Douglas-fir	44:109–110 (2005)
47. Acer negundo L. Boxelder	44:111–112 (2005)
48. Quercus velutina Lam. Black Oak	44:183–184 (2005)
49. Ailanthus altissima (Miller) Swingle Tree-of-Heaven	44:185–187 (2005)

tree is 60′. Another method that works quite well is to have someone of known height, say 6′, stand at the base of the tree. When you back away from the tree holding a yardstick at arms length, you will reach a point where you can measure the apparent height of the person standing at the tree base and the apparent height of the tree from that point. For instance, if the 6′ person measures 6″ on the yardstick (1″ for each foot) held at arm's length and the tree measures 30″, the height of the tree is 30′. For trees standing in a mixed woods where it may be difficult to be sure which top branches belong to which tree and shadows and long lines of sight are not available, the use of an Abney hand-held level, transit, or other instruments may be necessary. In those cases, County Extension Agents, county or city foresters, college or university personnel or other experienced persons may be of help.

A most imaginative method for measuring heights was undertaken by a person who waited for a very calm day, bought a helium filled balloon from a flower shop, tied it to the end of his fishing line, and let out enough line so the balloon rose to the top of the tree. He then tied a knot in the fishing line and reeled it in. Once the balloon was off, he tied the end of his line to a nearby shrub and backed away until he found his knot. With a tape measure it was easy and accurate to measure the distance from the end of the line to the knot. Voilà! He had his height.

The average crown spread can be measured by examining the farthest extent of the crown on all sides of the tree. You then measure the tip-to-tip distance across the largest crown length. Do the same at right angles to the first and average the two. The average is known as the average crown spread.

To report a big tree, first determine the identity of the tree. It will not be sufficient to say, "It is some kind of oak," unless you are prepared to send leaves, twig tips and acorns in with your measurements. Personnel from your County Extension Service or a nearby college or university may be able to help you confirm the identity of the tree. Second, take the measurements described above. If this is not practical, at least measure the girth in inches at 4½′ above the ground. Finally, send the name of the tree, its exact location, and measurements to the State's Big Tree Coordinator, (for the near future the author of this paper). This will insure consideration of the tree for inclusion in the state's Big Tree Inventory. It is hoped that GPS records can be included to more accurately indicate the location. You can always find out who the big tree coordinator is for any state in the country by contacting the Director, National Big Tree Program, American Forests, PO Box 2000, Washington D.C. 20013 (www.americanforests.org).

COMMENTS ON THE LIST OF THE BIG TREES & SHRUBS OF MICHIGAN

Much of the information in the list of the big trees and shrubs of Michigan (Table 2) is self-explanatory. In Tables 2 and 5 the State and National Champions are in bold face with the National Champions followed by an asterisk. Table 3 presents a list of the abbreviations used. Table 4 presents an alphabetical list of

TABLE 2. The Big Trees and Shrubs of Michigan. State Champions are in bold face. Current or Former National Champions are indicated by an asterisk. G = girth in inches at 4½ feet, H = height in feet, C.S. = average crown spread in feet and Pts.= (G + H + ¼ × C.S.)

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Abies balsamea *Balsam Fir*	158	77	70	42	Marquette *Huron Mt. Club*	Webster (Perkins) Site	D.Milarch & Elwood B. Ehrle	2001
Abies balsamea *Balsam Fir*	165	59	100	25	Mackinac *Marquette Twp.*	Trail # E 5210 N46°05.777′ - W84°27.875′	Fred Stuewer	2004
Abies balsamea ***Balsam Fir***	**208**	**84**	**116**	**33**	**Ontonagon** ***Porcupine Mt. State Park***	**Govt. Park Trail. In hemlock stand s of escarpment line**	**Paul Thompson**	**1961**
Abies balsamea *Balsam Fir*	179	79	89	44	Luce *Pine Stump Junction*	E side of Dawson Creek S of County Rd. 412	Paul Thompson	1968
Abies concolor ***White Fir***	**189**	**88**	**92**	**37**	**Ionia** ***Saranac***	**S side of cemetery**	**Elwood B. Ehrle**	**1996**
Abies concolor ***White Fir***	**184**	**86**	**91**	**27**	**Oakland** *Bloomfield Hills*	**111 Loan Pine Road**	**Paul Thompson & J. Wells**	**1983**
Abies concolor *White Fir*	155	75	71	34	Ingham *Michigan State University*	W of Mason Hall. N42°43′52.69″-W84°28′27.11″	Robert Bloye	2003
Abies concolor *White Fir*	183	92	80	42	Calhoun *Battle Creek*	Leila Arboretum N42°20.224′ – W85°12.795′	Jeff Boddy & Elwood B. Ehrle	2005
Abies fraseri ***Fraser Fir***	**102**	**47**	**45**	**38**	**Wayne** ***Northville***	**Bennett Arboretum**	**Gail McPherson**	**2002**
Abies grandis ***Giant Fir***	**21**	**9**	**9**	**10**	**Ingham** ***Michigan State University***	**SE corner of Auditorium N42°43′42.708″-W84°23′33.585″**	**Robert Bloye**	**2003**
Abies holophylla ***Manchurian Fir***	**128**	**57**	**61**	**38**	**Ingham** ***Michigan State University***	**Between Wills Hse. & Gilchrist N42°44′2.67″-W84°29′13.14″**	**Robert Bloye**	**2003**
Abies homolepis *Nikko Fir*	92	37	48	28	Ingham *Michigan State University*	Between Wills Hse. & Gilchrist N42°44′2.23″-W84°29′13.48″	Robert Bloye	2003

Abies homolepis ***Nikko Fir***	**126**	**60**	**56**	**40**	**Wayne** ***Northville***	**Bennett Arboretum**	**R. Pomorski & G. McPherson**	**2005**
Abies nordmanniana *Nordman Fir*	127	59	61	28	Ingham *Michigan State University*	W of Cowles House. N42°43′58.60″-W84°29′6.44″	Robert Bloye	2003
Abies nordmanniana ***Nordman Fir***	**140**	**63**	**70**	**26**	**Grand Traverse** ***Traverse City***	**State Hospital Grounds Promontory near DayCare Ctr. N44°45.102′-W85°35.003′**	**B. Zimmerman Elwood B. Ehrle**	**2005**
Abies veitchii ***Veitch Fir***	**170**	**84**	**77**	**34**	**Calhoun** ***Battle Creek***	**Liela Arboretum N42°20.239′ W85°12.784′**	**Jeff Boddy & Elwood B. Ehrle**	**2005**
Acer buergerianum ***Trident Maple***	**97**	**50**	**39**	**33**	**Ingham** ***Michigan State University***	**E of Burkey Hall N42°43′52.63″ W84°28′34″**	**Robert Bloye**	**2003**
Acer campestre *Hedge Maple*	141	70	59	47	Kalamazoo *Vicksburg*	Prudential Nursery	Cliff Walters	1965
Acer campestre *Hedge Maple*	149	75	64	40	Ingham *Michigan State University*	Campus Center West	Paul Thompson	1976
Acer campestre *Hedge Maple*		77			Jackson *Sharp Park*	S side of Log Cabin	Sharon Parker	1999
Acer campestre ***Hedge Maple***	**201**	**132**	**56**	**50**	**Kalamazoo** ***Gull Lake***	**Kellogg Biological Station – E side of Stack Bldg. N42°24.338′-W85°24.179′**	**Robert Bloye & Stu Bassett**	**2004**
Acer ginnala ***Amur Maple***	**113**	**72**	**30**	**44**	**Washtenaw** ***Ann Arbor***	**#1 Regent Place**	**AA Big Tree Registry**	**1995**
Acer ginnala *Amur Maple*	87	47	34	25	Ingham *Michigan State University*	NW of Williams Hall- leaning at 30°.N42°44′3.06″-W84°29′24.73″	Robert Bloye	**2003**
Acer griseum ***Paperbark Maple***	**71**	**37**	**27**	**28**	**Washtenaw** ***Ann Arbor***	**925 Aberdeen**	**AA Big Tree Registry**	**1995**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Acer griseum **Paperbark Maple**	**67**	**29**	**31**	**28**	**Ingham** ***Michigan State University***	**Between Gilchrist and Mayo Hall** **N42°44′4.18″-W84°29′10.93″**	**Robert Bloye**	**2003**
Acer mandchuricum ***Manchurian Maple***	**72**	**30**	**33**	**34**	**Ingham** ***Michigan State University***	**N of Lendon Hall** **N42°44′3.39″- W84°29′7.57″**	**Robert Bloye**	**2003**
Acer mayrii ***Kurozi-Itaya Maple***	**24**	**6**	**15**	**10**	**Ingham** ***Michigan State University***	**NW corner of Cowles House** **N42°43′59.08″W84°29′5.86″**	**Robert Bloye**	**2003**
Acer negundo ***Box Elder***	**353**	**260**	**76**	**67**	**Washtenaw** ***Milan***	**226 Main St. N42°04.970′-** **W83°40.710′**	**R. Pomorski,** **G. Mcpherson,** **Elwood B. Ehrle**	**2003**
Acer negundo *Box Elder*	348	219	100	117	Livingston *Cohoctah*	N of Howell	M. Limbers	1980
Acer negundo * ***Box Elder***	**356**	**214**	**110**	**127**	**Washtenaw** ***NW of Milan***	**Saline & Mooreville Roads**	**Paul Thompson** **& H. J.Neff**	**1972**
Acer nigrum *Black Maple*	310	174	110	102	*Macomb* *W of Mt. Clemens*	Opposite Resurrection Cemetery	H.J. Neff	
Acer nigrum *Black Maple*	295	175	96	94	Oakland *N of Northville (Novi)*	Near 43180 9 Mile Road	John Consolata	
Acer nigrum * ***Black Maple***	**332**	**182**	**118**	**127**	**Allegan** ***Allegan***	**Thomas & Jackson Streets** **W bank of Kalamazoo River**	**Elwood B. Ehrle**	**2006**
Acer pensylvanicum ***Striped Maple***	**114**	**44**	**59**	**43**	**Marquette** ***Huron Mt. Club***	**S Rush Lake Trail**	**Paul Thompson** **& D. Bingham**	**1973**
Acer pensylvanicum *Striped Maple*	94	33	54	29	Marquette *Huron Mt. Club*	E of Club Farm	Paul Thompson	
Acer pensylvanicum *Striped Maple*	82	31	46	21	Mackinac *11 mi SW of Gould City*	0.5 mi S of Batty Inn	Paul Thompson	1975

Acer platanoides *Norway Maple*	268	138	104	102	Wayne *Grosse Pointe Farms*	Lakeshore Drive Between Newberry & Moran	H.J. Neff	1972
Acer platanoides *Norway Maple*	224	120	84	78	Grand Traverse *Traverse City*	428 6th St.	Joseph Field – DNR	
Acer platanoides ***Norway Maple***	**277**	**179**	**80**	**70**	**Leelenau** ***Empire***	**Front St. –Fred Taghorn Residence. 1995 –272 pts.**	**R. Pomorski** **Elwood B. Ehrle**	**2004** **1995**
Acer platanoides var. schwedleri—*Schwedler Maple*	**210**	**132**	**64**	**56**	**Ingham** ***Michigan State University***	**N of Campbell Hall** **N42°44′5.51″-W84°29′3.35″**	**Robert Bloye**	**2003**
Acer pseudoplatanus ***Sycamore Maple***	**186**	**119**	**53**	**54**	**Manistee** ***Manistee*** **Was 178 pts. in 1995**	**Lake Bluff Audubon Club** **2890 Lakeshore Drive** **N44°17.477′-W86°18.609′**	**Elwood B. Ehrle**	**2004**
Acer pseudoplatanus *Sycamore Maple*	106	55	42	37	Ingham *Michigan State University*	Between Museum & Clock Tower N42°43′54.44″-W84°28′55.36″	Robert Bloye	2003
Acer rubrum *Red Maple*	305	197	90	72	Macomb *Armada*	23060 Torrey Drive	Paul Thompson Joe Kaplan	1997
Acer rubrum *Red Maple*	309	156	126	108	Macomb *Near Utica*	Utica Recreation Area— East Side	Paul Thompson	1986
Acer rubrum *Red Maple*		238			St. Clair *Ruby*	4687 Abortford N	R. Lipanski	2004
Acer rubrum ***Red Maple***	**336**	**233**	**75**	**113**	**St. Clair *China Township, SW of St. Clair***	**6700 Puttygut Road** **B.A.Dumann Farm.** **N42°47.339′-W82°34.763′**	**Elwood B. Ehrle**	**2003**
Acer saccharinum *Silver Maple*	383	206	142	140	Berrien *Berrien Springs*	N River—Indian Bowl	Ed Pantallon	1971
Acer saccharinum *Silver Maple*	395	297	79	77	Oakland *6 mi N of Rochester*	405 W Stony Creek Rd. 0.5 mi W of Rochester Rd.	H.J. Neff Joe Kaplan	1997
Acer saccharinum *Silver Maple*		276			Montcalm *Carson City*	Big Tree Contest 4 trees in a row.	Jeff Vandenberg	2002

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Acer saccharinum *Silver Maple*	389	234	126	117	Washtenaw *NW of Ann Arbor*	3735 Tubbs Road	Paul Thompson	1968
Acer saccharinum *Silver Maple*	388	212	145	124	Kalamazoo *Augusta*	Fort Custer. DWH Headquarters	Paul Thompson	1970
Acer saccharinum *Silver Maple*		267			Jackson *Jackson*	7435 Mt. Hope Rd. (Private) Jackson Co. Big Tree List	Sharon Parker	1994
Acer saccharinum * ***Silver Maple***	**477**	**347**	**115**	**61**	**Luce** ***Newberry***	**McPhee Landing** **Near Boat Launch**	**C.A. Wade**	**2002**
Acer saccharum *Sugar Maple*	323	225	78	80	Manistee *E of Bear Lake*	Big 4 Road	Elwood B. Ehrle	1995
Acer saccharum *Sugar Maple*	335	193	117	100	Allegan *Douglas*	121 Ferry St.	J. Brigham	1997
Acer saccharum ***Sugar Maple***	**341**	**197**	**116**	**112**	**Grand Traverse** ***Old Mission Peninsula***	**Old Mission Bluff Road near subdiv. Bluff Dev. To W**	**Paul Thompson & J. Spencer**	**1986**
Acer saccharum ***Sugar Maple***	**343**	**215**	**102**	**102**	**Leelenau** ***W side Co. Rd. 645***	**0.9 mi S of M-204**	**John Spencer** **Joe Kaplan**	**1984** **1996**
Acer saccharum *Sugar Maple*	243	141	85	66	Osceola *Reed City*	Quakers Acres, Seven Mile Rd.	Terry Kooiker	1997
Acer saccharum *Sugar Maple*		199			Mason *Ludington*	Alley, NE corner of Gaylord & Pere Marquette Streets	Mason/Oceana Big Tree List	
Acer saccharum *Sugar Maple*		235			Grand Traverse *S edge of Traverse City*	150 yards N of Hammond and LaFranier. 2nd White House	John Spencer	2005
Acer spicatum *Mountain Maple*	78	20	50	30	Delta *Garden Peninsula*	4 mi S Garden, S River Bay T39NR19W, Sect. 26	Don Henson	

Acer spicatum *Mountain Maple*	73	16	48	34	Leelenau *S Manitou Island*	Valley of Giants	Paul Thompson	1969
Acer spicatum * ***Mountain Maple***	**99**	**33**	**58**	**31**	**Houghton** ***2 mi SE of Beacon Hill***	**T55NR35W, Sect 32 SE NW**	**Paul Thompson & N. Krenzer**	**1979**
Aesculus glabra ***Ohio Buckeye***	**189**	**109**	**68**	**47**	**Sanilac** ***Lexington***	**5666 Main (US 25) S part of town**	**H.J. Neff**	**1971**
Aesculus glabra ***Ohio Buckeye***	**185**	**106**	**67**	**47**	**Branch** ***Coldwater***	**W of J St. , RR**	**H.J. Neff**	**1968**
Aesculus hippocastanum *Horse-Chestnut*	269	158	91	81	St. Clair *Clay Township*	5505 Pt. Tremble—next door	A. Jankowski	1983
Aesculus hippocastanum *Horse-Chestnut*	250	165	70	58	Macomb *Macomb*	34331 Sherwood – AETNA Ind. Between N 283, 9 & 10 mi Rd.	H.J. Neff	1964
Aesculus hippocastanum ***Horse-Chestnut***	**275**	**165**	**93**	**69**	**Wayne** ***Grosse Ile***	**24356 E. River Rd.**	**Paul Thompson Joe Kaplan**	**1963 1996**
Aesculus hippocastanum Horse-Chestnut	251	179	58	56	Antrim *Elk Rapids*	10198 US 31-0.1 mi S of Water Tower. N44°53.146′W85°24.841′ 3 trunks @ 4′2″	R. Pomorski & Elwood B. Ehrle	2005
Aesculus octcandra ***Yellow Buckeye***	**177**	**102**	**64**	**43**	**Kalamazoo** ***Gull Lake***	**Kellogg Biological Station N of Manor Hse. Betw.pkg. lots N42°24.389′-W85°24.179′**	**Robert Bloye & Stu Bassett**	**2004**
Aesculus pavia ***Red Buckeye***	**91**	**48**	**35**	**32**	**Kalamazoo** ***Kalamazoo***	**Kings Highway— Red Arrow Golf Course. N42°17.478′-W85°34.100′**	**Elwood B. Ehrle**	**2005**
Aesculus ×carnea ***Red Horse-Chestnut***	**213**	**128**	**72**	**52**	**Kalamazoo** ***Vicksburg***	**Prudential Nursery. 0.1 mi W of S Sprinkle Rd. A likely hybrid! N42°07.665′-W85°31.695′**	**Elwood B. Ehrle**	**2005**
Ailanthus altissima ***Tree-of-Heaven***	**282**	**200**	**63**	**76**	**Washtenaw** ***Milan***	**Electric and Sturgis Rd. N42°56.291′-W82°27.263′**	**Elwood B. Ehrle**	**2003**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Ailanthus altissima *Tree-of-Heaven*	250	180	55	60	Washtenaw *Milan*	Dexter & Phillips St. N42°05.481′-W83°40.605′	Elwood B. Ehrle Gail McPherson	2003
Ailanthus altissima *Tree-of-Heaven*	246	135	91	81	St. Clair *Marine City*	1020 Bruce St. S of Belle River Drive	H.J. Neff	1989
Albizzia julibrissen ***Mimosa***	**56**	**23**	**25**	**33**	**Kalamazoo** ***Comstock***	**Comstock Ave.** **1 block W. of Bell's Nursery**	**Elwood B. Ehrle**	**2006**
Alnus glutinosa ***Black Alder***	**161**	**84**	**66**	**45**	**Wayne** ***Trenton***	**Elizabeth Park** **E. bank of channel**	**H.J. Neff**	
Alnus glutinosa *Black Alder*	117	49	61	29	Washtenaw *NW of Ann Arbor*	S edge of Huron River Just W of US 23 bridge ½ mi E of Maple St. Bridge	Paul Thompson	1968
Alnus glutinosa *Black Alder*	102	53	40	36	Wayne *Grosse Ile*	W of 19888 E River Drive	Paul Thompson	1964
Alnus rugosa *Speckled Alder*	68	30	30	30	St. Clair *Avoca*	4238 Bricker. Main trunk cut off. N43°1.412′-W82°43.896′	Elwood B. Ehrle	2003
Alnus rugosa *Speckled Alder*	87	25	56	23	Allegan *Allegan Game Area*	E Bank of Swan Creek. 300 feet N of 118 Ave.	H.J. Neff	1966
Alnus rugosa *Speckled Alder*	90	30	54	23	Ottawa *Holland*	Edge of swamp. Ottawa Beach Rd. W of Lake Breeze Rd.	Paul Thompson	
Alnus rugosa * ***Speckled Alder***	**118**	**38**	**66**	**56**	**St. Clair** ***Avoca***	**4238 Bricker**	**Paul Thompson** **W. Brennen**	
Amelanchier arborea ***Downy Serviceberry***	**161**	**79**	**63**	**74**	**Barry** ***4 mi NE of Cloverdale***	**425 Pritchardville** **6 mi S of Hastings**	**Paul Thompson** **H. Jones**	**1983**
Amelanchier arborea *Downy Serviceberry*	93	41	43	35	Ingham *Okemas*	Edgebrook Farm	Paul Thompson	1964

Amelanchier arborea *Downy Serviceberry*	112	41	57	54	Oakland *Utica*	Rochester Recreation Area	Paul Thompson	
Amelanchier laevis ***Allegheny Serviceberry***	**122**	**69**	**42**	**44**	**Leelenau** ***S of Maple City***	**S.R. 72 – Sect 35**	**A. Tesaker**	**1963**
Amelanchier laevis *Allegheny Serviceberry*	70	23	42	20	Houghton	500 Garnet St.	Robert Brown Ed Voss	1988
Amelanchier sanguinea ***Roundleaf Serviceberry***	**62**	**16**	**38**	**30**	**Keweenaw** ***Copper Harbor***	**M-26 Near Fort Wilkins**	**Paul Thompson**	**1968**
Amelanchier sanguinea *Roundleaf Serviceberry*	40	10	27	13	Oakland *Haven Hill*	Near Ecology Trail, West area	Paul Thompson	
Amorpha fruticosa **False Indigo**	**24**	**7**	**14**	**11**	**Washtenaw** **Ann Arbor**	**Gallup Park, 75 feet upstream From Huron Parkway overpass**	**Ron Gamble**	**2003**
Aralia spinosa ***Devil's Walking Stick***	**63**	**19**	**36**	**30**	**Oakland** ***Bloomfield Hills***	**Cranbrook Institute of Sciences Booth House**	**Paul Thompson**	**1973**
Aronia melanocarpa ***Chokeberry***	**24**	**5**	**18**	**5**	**Oakland** ***North Milford***	**Fish Lake Bog. Highland**	**Paul Thompson**	**1958**
Asimina triloba ***Paw Paw***	**85**	**39**	**37**	**34**	**Van Buren** ***Paw Paw***	**Community Education Building 600 E Michigan Ave. N42°14.077′-W85°52.970′**	**Elwood B. Ehrle & Stan Pefley**	**2003**
Betula allegheniensis ***Yellow Birch***	**310**	**186**	**104**	**78**	**Mackinac** ***Gould City***	**7.1 mi S on Gould City Rd. 0.5 mi E on 2-track**	**Elwood B. Ehrle & D. Milarch**	**2001**
Betula allegheniensis *Yellow Birch*	273	165	89	76	Ontonagon *Porcupine Mt. State Park*	N of Little Carp River	Paul Thompson	1971
Betula allegheniensis *Yellow Birch*	282	157	101	96	Keweenaw *Copper Harbor*	2 mi S	Paul Thompson	1971
Betula nigra ***River Birch***	**191**	**115**	**58**	**70**	**Washtenaw** ***Ann Arbor***	**1515 Granger**	**AA Big Tree Registry**	**1995**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Betula nigra *River Birch*	144	67	63	56	Van Buren *Paw Paw*	La Grare St. S highway Paw Paw Shopping Center	H.J. Neff	1971
Betula nigra *River Birch*	170	73	76	82	Wayne *Trenton*	Elizabeth Park E bank of channel near entrance Also at river side	H.J. Neff	1970
Betula nigra *River Birch*		77			Kalamazoo *Kalamazoo*	3743 Gull Rd.—Back yard.	J. Guzinski	
Betula occidentalis ***Western Paper Birch***	**100**	**29**	**55**	**62**	**Ingham** ***Michigan State University***	**Beal Gardens by garden pond** **N42°43′51.29″-W84°29′4.68″**	**Robert Bloye**	**2003**
Betula papyrifera var. cordifolia * ***Mountain Paper Birch***	**218**	**106**	**90**	**88**	**Leelenau** ***Glen Haven***	**Near Sleeping Bear Dunes**	**Paul Thompson**	**1972**
Betula papyrifera var. cordifolia * *Mountain Paper Birch*	202	115	67	80	Leelenau *Glen Haven*	Harwood Rd. Glen Haven, MI N44°53.528′-W86°02.379′	Elwood B. Ehrle	2006
Betula papyrifera *Paper Birch*	270	166	83	83	Schoolcraft *Thompson*	2.5 mi S of Thompson Little Harbor Rd.	Don Henson	1996
Betula papyrifera * ***Paper Birch***	**348**	**222**	**107**	**76**	**Huron** ***Grindstone City***	**3379 Pt. Aux Barques** **Whalen Trailer Court**	**B. Dunn**	**1962**
Betula papyrifera * ***Paper Birch***	**346**	**220**	**107**	**76**	**Cheboygan** ***Near Black Lake***		**Robert Stein**	
Betula pendula ***European White Birch***	**254**	**158**	**78**	**71**	**Leelenau** ***NW of Traverse City***	**9510 Cherry Bend Rd.**	**Elwood B. Ehrle**	**1995**
Betula ×purpusii ***Hybrid Birch***	**53**	**18**	**31**	**14**	**Jackson** ***N side of Brill Lake***	**0.22 mi W of Lutz Rd.**	**Warren Herb Wagner**	**1975**

Carpinus caroliniana *American Hornbeam*	**118**	**69**	**41**	**33**	**Oakland** *Bloomfield Hills*	**4511 Lane Lake Rd. Gilbert Lake**	**Joe Kaplan**	**1996**
Carpinus caroliniana *American Hornbeam*	89	43	40	22	Oakland *Ferndale*	1350 Jean St.	Paul Thompson Joe Kaplan	1997
Carya cordiformis *Bitternut Hickory*	**291**	**170**	**101**	**79**	**Shiawassee** *4 mi N of Owasso*	**Owasso Country Club**	**N.F. Bach**	**1984**
Carya cordiformis *Bitternut Hickory*	270	145	105	80	Cass *Marcellus*	¼ mi SW of intersection of Wright and Burlington Roads	L. Lewis	1964
Carya cordiformis *Bitternut Hickory*	**291**	**138**	**129**	**96**	**Cass** *W of Marcellus*	**Burlington Road**	**Paul Thompson**	**1975**
Carya cordiformis *Bitternut Hickory*	248	147	86	60	Oceana *Walkerville*	144th Ave., S of Tyler Rd. Mason/Oceana Big Tree List		
Carya glabra *Pignut Hickory*	242	147	75	80	Kalamazoo *Scotts*	10593 S 37th St. N42°09.837′-W85°24.176′	Elwood B. Ehrle	2004
Carya glabra *Pignut Hickory*	243	136	91	64	Jackson *N of Jackson*	River Junction Road, 2 mi N of M-50	H.J. Neff	1971
Carya glabra *Pignut Hickory*	**255**	**134**	**96**	**101**	**Monroe** *S of Monroe*	**S Otter Creek Road, 0.4 mi E of US 125 – top of tree gone**	**Paul Thompson**	**1975**
Carya glabra *Pignut Hickory*	234	134	80	78	Oakland *Franklin*	E of Inkster & Crestwood 27310	Paul Thompson	1975
Carya illinoensis *Pecan*	212	124	69	77	Washtenaw *S of New Hudson*	Opposite 8510 Dixboro Rd.	M. Latson	
Carya illinoensis *Pecan*	**261**	**174**	**70**	**68**	**Kalamazoo** *Gull Lake*	**Kellogg Biological Station N42°23.797′-W85°23.289′ Near Research Building**	**Robert Bloye & Stu Bassett**	**2004**
Carya laciniosa *Shellbark Hickory*	**164**	**105**	**40**	**74**	**Genesee** *West Grand Blanc*	**Opposite 1183 E. Cook Now topped @ 40′**	**Paul Thompson**	**1965**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Carya ovata *Shagbark Hickory*	203	117	72	56	Oakland *¼ mi E of Newark*	Bedford Rd., 2 mi W of Dixie Highway	H.J. Neff	
Carya ovata *Shagbark Hickory*	208	127	68	52	Washtenaw *N of Clinton*	Lima Center Road, N of Fish Rd.	H.J. Neff	1971
Carya ovata ***Shagbark Hickory***	**228**	**127**	**89**	**48**	**Washtenaw** ***W of Bridgewater***	**Ernst Rd. N of Austin Rd.**	**H.J. Neff**	**1968**
Castanea dentata *American Chestnut*	292	208	64	80	Grand Traverse *Old Mission Peninsula*	18367 Old Mission Rd.	Elwood B. Ehrle	1995
Castanea dentata ***American Chestnut***	**300**	**202**	**73**	**100**	**Kent** ***Grant***	**17085 Moore Rd.** **¼ mi W of M37**	**Paul Thompson**	**1965**
Castanea dentata *American Chestnut*	228	153	60	58	Manistee *T24NR14W*	Sweltzer Rd., ½ mi W of Moore Rd.	Renschel	1968
Castanea mollissima ***Chinese Chestnut***	**192**	**123**	**52**	**66**	**Kalamazoo** ***Gull Lake***	**Kellogg Biological Station SE of Longwood pond, old grove. N42°23.884′-W85°23.496′**	**Robert Bloye & Stu Bassett**	**2004**
Catalpa bignonioides *Southern Catalpa*	270	165	84	85	Allegan *Granger*	Old US 131, W side, #2174 Front yard	Paul Thompson	1965
Catalpa bignonioides ***Southern Catalpa***	**283**	**195**	**72**	**62**	**Kent** ***Sparta***	**101 W Division St.** **N43°9.681′-W85°42.757′**	**Elwood B. Ehrle**	**2003**
Catalpa bignonioides ***Southern Catalpa***	**283**	**167**	**94**	**86**	**Lenawee** ***Tecumseh***	**601 W Chicago**	**Paul Thompson**	**1975**
Catalpa speciosa *Northern Catalpa*	276	197	63	62	Ionia *Portland*	521 Looking Glass Road Front Yard	Elwood B. Ehrle	1996
Catalpa speciosa *Northern Catalpa*	234	159	61	54	Jackson *N of Jackson*	4687 Henry Road W of River Junction Road	H.J. Neff	1971

Catalpa speciosa *Northern Catalpa*	308	191	98	76	Eaton *Grand Ledge*	Alternate 100 & Willow Rd. SW corner	Paul Thompson	1987
Catalpa speciosa *Northern Catalpa*	231	160	54	67	Oakland *Southfield*	S Franklin & Telegraph	Paul Thompson	1983
Catalpa speciosa * ***Northern Catalpa***	**370**	**242**	**107**	**85**	**Ingham** ***Lansing***	**State Capital Grounds**	**Paul Thompson**	**1970**
Cedrus lebani ***Cedar of Lebanon***		**59**			**Washtenaw** ***Ann Arbor***	**Big Tree Contest**	**Richard Pomorski**	**2002**
Celtis occidentalis ***Common Hackberry***	**313**	**190**	**98**	**98**	**Allegan** ***Plainwell***	**M-89 at Main St.**	**H.J. Neff**	**1966**
Celtis occidentalis *Common Hackberry*	279	159	99	85	Monroe *Dundee*	Washington & Cross, 1 block S of M-50	H. J. Neff	1966
Celtis occidentalis *Common Hackberry*	277	161	95	85	Wayne *Wankin Mills*	30500 Warren, E of Merriman	M. Ellsworth	1965
Celtis occidentalis *Common Hackberry*	273	169	87	69	Branch *Coldwater*	Jay and Garfield Rd. SW edge of city	Paul Thompson	1968
Celtis tenuifolia * ***Dwarf or Georgia Hackberry***	**74**	**43**	**26**	**21**	**Washtenaw** ***3 mi N of Chelsea***	**Island Lake Rd. Near Intersection of Werkner Rd.**	**Wm. Luitje & Anton Resnicek**	**2003**
Cephalanthus occidentalis *Buttonbush*	47	28	16	10	Oakland *Bloomfield Hills Nature Study Area*	Quarton Rd. (16 mile), 0.5 mi W of Telegraph. Between the schools	Joe Kaplan	1997
Cephalanthus occidentalis ***Buttonbush***	**76**	**35**	**35**	**25**	**Oakland** ***Bloomfield Hills***	**Ward Preserve**	**Paul Thompson**	**1973**
Cephalanthus occidentalis *Buttonbush*	56	24	26	24	Van Buren *SE of Eagle Lake*	E side of M-40, 2 mi S of I-94 In low swamp	Paul Thompson	1975
Cercidiphyllum japonicum *Katsura Tree*	93	42	43	32	Washtenaw *Ann Arbor*	#1 Regent Place	AA Big Tree Registry	1995

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Cercidiphyllum japonicum ***Katsura Tree***	**192**	**149**	**24**	**77**	**Ingham** ***Michigan State University***	**Beal Gardens.** **N end of middle garden.** **N42°43′53.62″-W84°29′2.60″**	**Robert Bloye**	**2003**
Cercis canadensis *Eastern Redbud*	125	87	29	36	Washtenaw *Ann Arbor*	1605 Morton	AA Big Tree Registry	1995
Cercis canadensis *Eastern Redbud*	108	47	52	37	Oakland *Bloomfield Hills*	Cranbrook Institute of Science In back of big house	Paul Thompson	1970
Cercis canadensis* ***Eastern Redbud***	**148**	**113**	**26**	**35**	**Wayne** ***Northville***	**Annapolis Hospital**	**R. Pomorski** **G. McPherson**	**2005**
Cercis canadensis *Eastern Redbud*	106	66	30	38	Berrien *Buchanan*	455 Moccasin, next house	S. Beikman	1983
Cercis canadensis forma alba ***White Eastern Redbud***	**56**	**29**	**21**	**24**	**Ingham** ***Michigan State University***	**SE corner of Grand River Ave. and Beal entrance.** **N42°44′2.58″-W84°29′2.60″**	**Robert Bloye**	**2003**
Chamaecyparis nootkatensis ***Alaska-Cedar***	**42**	**16**	**23**	**11**	**Ingham** ***Michigan State University***	**S of Morrell Hall,** **across street & W of Linton Hall.** **Largest of 3 trunks.** **N42°43′56.72″-W84°28′51.70″**	**Robert Bloye**	**2003**
Chamaecyparis obtusa ***Hinoki False Cypress***	**138**	**66**	**64**	**32**	**Kalamazoo** ***Gull Lake***	**Kellogg Biological Station** **30′ from NE end of Stack Bldg.** **N42°24.326′-W85°24.023′**	**Elwood B. Ehrle** **Stu Bassett**	**2005**
Chionanthus retusus ***Chinese Fringetree***	**76**	**37**	**31**	**32**	**Ingham** ***Michigan State University***	**Beal Gardens** **SE corner of circle** **N42°43′53.34″-W84°29′8.95″**	**Robert Bloye**	**2003**
Chionanthus virginicus ***Fringetree***	**54**	**14**	**33**	**26**	**Oakland** ***Bloomfield Hills***	**Cranbrook Institute of Science**	**Paul Thompson**	**1977**

Chionanthus virginicus *Fringetree*		55			Washtenaw *Ann Arbor*	Big Tree Contest	Richard Pomorski	2002
Cladrastis kentukea ***Yellow-wood***	**279**	**150**	**104**	**99**	**Monroe** ***W of Flat Rock***	**N of Will Carleton Rd.**	**Paul Thompson**	**1992**
Cladrastis kentukea ***Yellow-wood***	**281**	**177**	**80**	**96**	**Washtenaw** ***Ann Arbor***	**227 Barton Shores Drive**	**Paul Thompson**	**1980**
Cladrastis kentukea *Yellow-wood*	163	99	51	51	Ingham *Michigan State University*	Between museum and Human Biology Building. N42°43′59.20″-W84°28′55.03″	Robert Bloye	2003
Cladrastis kentukea *Yellow-wood*	203	92	93	71	Oakland *Bloomfield Hills*	SE Cranbrook Institute of Science	Paul Thompson	1977
Cornus alternifolia ***Alternate Leaf Dogwood***	**69**	**22**	**36**	**44**	**Lenawee** ***S of Tecumseh***	**East of junction Ives and Parsons Center**	**Paul Thompson**	**1987**
Cornus alternifolia ***Alternate Leaf Dogwood***	**71**	**25**	**39**	**27**	**Oakland** ***Birmingham***	**17500 Kirkshire Rd. Beverly Hills**	**Paul Thompson Joe Kaplan**	**1997**
Cornus florida ***Flowering Dogwood***	**124**	**55**	**55**	**56**	**St. Joseph** ***4½ mi W of Burr Oak***	**N of road, W end of small valley Fred Dort farm**	**Paul Thompson Cowles**	**1968**
Cornus florida *Flowering Dogwood*	111	43	57	44	Ottawa *Holland*	245 Norwood, front yard	R. Sheibach	
Cornus florida forma rubra ***Red Flowering Dogwood***	**40**	**14**	**21**	**19**	**Ingham** ***Michigan State University***	**Beal Garden,S side of circle, just beyond pool. N42°43′52.94″-W84°29′9.93″**	**Robert Bloye**	**2003**
Cornus kousa var. chinensis ***Chinese Dogwood***	**43**	**15**	**21**	**26**	**Ingham** ***Michigan State University***	**Beal Garden, E of SE corner of circle. N42°43′51.79″-W84°29′7.91″**	**Robert Bloye**	**2003**
Cornus mas ***Cornelian Cherry***	**59**	**22**	**26**	**45**	**Ingham** ***Michigan State University***	**Beal gardens by fish pond. N42°43′51.54″-W84°29′5.06″**	**Robert Bloye**	**2003**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Cornus mas *Cornelian Cherry*	52	19	27	25	Ingham *Michigan State University*	SE side of Yakeley Hall N42°44′1.24″-W84°29′10.08″	Robert Bloye	2003
Cornus purpusii ***Silky Dogwood***	**19**	**6**	**11**	**9**	**Oakland** ***Beverly Hills***	**17503 Kirkshire**	**Paul Thompson**	**1964**
Cornus racemosa ***Gray Dogwood***	**40**	**14**	**22**	**15**	**Wayne** ***Grosse Ile***	**24532 East River Road**	**Paul Thompson**	**1963**
Cornus racemosa ***Gray Dogwood***	**39**	**13**	**22**	**16**	**Wayne** ***Grosse Ile***	**27740 S Pointe Rd.**	**Paul Thompson**	**1964**
Cornus racemosa *Gray Dogwood*	30	13	15	6	Oakland *Birmingham*	231 Larchlea Rd., W side of Presbyterian Church	R. Pomorski G. McPherson	2004
Cornus stolonifera ***Red Osier Dogwood***	**32**	**10**	**17**	**20**	**Benzie** ***Frankfort***	**M-22 & Anderson Rd.**	**A. Tesaker**	
Corylus americana *Hazelnut*	55	16	31	33	Oakland *Bloomfield Hills*	Lone Pine & 491 Martell Rd.	Paul Thompson Joe Kaplan	1996
Corylus americana ***Hazelnut***	**84**	**40**	**35**	**35**	**Washtenaw** ***Ann Arbor***	**435 Stein Rd.**	**G. McPherson &** **R. Pomorski.**	2005
Cotinus coggygria *Common Smoketree*	49	26	17	23	Oakland *Ferndale*	1728 Pinecrest Rd at 9 mile Rd.	Paul Thompson Joe Kaplan	1976 1996
Cotinus coggygria ***Common Smoketree***	**55**	**20**	**28**	**28**	**Oakland** ***New Hudson***	**57140 Pontiac Trail**	**Paul Thompson**	**1975**
Cotinus coggygria ***Common Smoketree***	**55**	**19**	**27**	**35**	**Oakland** ***Birmingham***	**Hold Residence**	**Paul Thompson**	**1983**
Cotinus coggygria ***Common Smoketree***	**53**	**28**	**18**	**28**	**Ingham** ***Michigan State University***	**Traffic Island SW of Gilchrist Hall. N42°44′0.37″-84°29′14.73″**	**Robert Bloye**	**2003**

Cotinus obovatus ***American Smoketree***		**25**			**Jackson** ***Jackson Comm. College***	**JCC along Browns Lake Road Jackson County Big Tree**	**Sharon Parker**	**1998**
Crataegus calpodendron ***Pear Hawthorn***	**47**	**18**	**20**	**34**	**Ingham** ***Michigan State University***	**Beal Garden, SE corner between sidewalk and Red Cedar River N42°43′48.15″-W84°29′3.04″**	**Robert Bloye**	**2003**
Crataegus crus-galli ***Cockspur Hawthorn***	**73**	**38**	**29**	**23**	**Wayne** ***Livonia***	**Rear of 34001 Ann Arbor Trail**	**Paul Thompson**	**1959**
Crataegus douglasii ***Douglas Hawthorn***	**67**	**40**	**25**	**8**	**Chippewa** ***Sugar Island***		**J. Hiltunen**	**1964**
Crataegus laevigata ***Paul's Scarlet Hawthorn***	**62**	**25**	**31**	**24**	**Ingham** ***Michigan State University***	**Beal Gard., far west side between river and sidewalk. S of circle. N42°43′58.90″W84°29′12.31″**	**Robert Bloye**	**2003**
Crataegus mollis * ***Downy Hawthorn***	**149**	**99**	**41**	**35**	**Wayne** ***Grosse Ile***	**8120 Macomb. Past National Champion**	**G. McPherson R. Pomorski**	**2004**
Crataegus mollis ***Downy Hawthorn***	**146**	**70**	**59**	**66**	**Oakland** ***Beverly Hills***	**32440 Worchester**	**Paul Thompson**	**1975**
Crataegus mollis *Downy Hawthorn*	143	79	48	64	Oakland *Beverly Hills*	31220 Sheridan	Paul Thompson	1959
Crataegus mollis ***Downy Hawthorn***	**148**	**103**	**35**	**41**	**Wayne** ***Dearborn***	**20900 Oakwood. Front entrance to Ford Museum**	**R. Pomorski**	**2004**
Crataegus mollis var. arnoldiana ***Arnold's Hawthorn***	**45**	**18**	**18**	**34**	**Ingham** ***Michigan State University***	**Beal Garden, N border. N42°43′54.30″-W84°29′3.85″**	**Robert Bloye**	**2003**
Crataegus monogyra ***Oneseed Hawthorn***	**103**	**43**	**52**	**30**	**Wayne** ***Trenton***	**Elizabeth Park—north**	**Paul Thompson**	**1975**
Crataegus monogyra *Oneseed Hawthorn*	68	28	33	28	Ingham *Michigan State University*	SE of Union. N42°43′59.36″-W84°28′56.57″	Robert Bloye	2003

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Crataegus phaenopyrum ***Washington Hawthorn***	**57**	**16**	**36**	**19**	**Oakland** ***Beverly Hills***	**17503 Kirkshire**	**Paul Thompson**	**1982**
Crataegus phaenopyrum *Washington Hawthorn*	51	22	24	19	Ingham *Michigan State University*	N side of Williams Hall. NE corner of patio. N42°44′4.85″-W84°29′17.94″	Robert Bloye	2003
Crataegus pinnatifida ***Russian Hawthorn***	**35**	**15**	**15**	**21**	**Ingham** ***Michigan State University***	**NW of Williams Hall.** **N42°44′2.30″- W84°29′19.97″**	**Robert Bloye**	**2003**
Crataegus pruinosa ***Frosted Hawthorn***	**39**	**20**	**14**	**18**	**Ingham** ***Michigan State University***	**S of Merrill Hall, across the street and W of Union Hall** **N42°43′57.25″-W84°28′50.80″**	**Robert Bloye**	**2003**
Crataegus punctata ***Dotted Hawthorn***	**102**	**50**	**39**	**52**	**Oakland** ***Bloomfield Hills***	**S end of Guilford Rd**	**Paul Thompson**	**1959**
Crataegus punctata *Dotted Hawthorn*	88	33	44	45	Oakland *Bloomfield Hills*	E end of Guilford Rd	Paul Thompson	1959
Crataegus sp. *Hawthorn*	118	71	36	45	Wayne *Grosse Ile*	19903 Park Lane	G. McPherson R. Pomorski	2004
Crataegus viridis ***Green Hawthorn***	**66**	**32**	**27**	**26**	**Ingham** ***Michigan State University***	**SE corner of Beal Gardens. N of sidewalk by Red Cedar River.** **N42°43′48.57″-W84°29′2.63″**	**Robert Bloye**	**2003**
Cryptomeria japonica ***Japanese Cedar***	**100**	**38**	**55**	**28**	**Ingham** ***Michigan State University***	**W bank of Beal Gardens.** **N42°43′53.73″-W84°29′4.71″**	**Robert Bloye**	**2003**
Cryptomeria japonica var. lobbii ***Japanese Cedar***	**63**	**20**	**40**	**11**	**Ingham** ***Michigan State University***	**Beal Gardens, E side of circle.** **N42°43′52.67″W84°29′6.60″**	**Robert Bloye**	**2003**
Cryptomeria japonica var. lobbii *Japanese Cedar*	41	17	22	9	Oakland *Cranbrook Inst. Science*	Oriental garden at E end of Kingswood Lake. N 42°34′16.103″-W83°14′37.353″	Robert Bloye	2003

Diospyros virginiana *Persimmon*	**161**	**95**	**55**	**45**	**Kent** *Grand Rapids*	**1716 N Center N42°59.672′-W85°40.051′**	**Elwood B. Ehrle Fred Nietering**	**2003**
Diospyros virginiana *Persimmon*	134	54	68	47	Washtenaw *Ann Arbor*	4th St., N of Packard Planted 1898	M. Kropp	1960
Elaeagnus angustifolia *Russian Olive*	141	66	61	54	Oakland	1509 Wrenwood	J. Wells & Paul Thompson	1984
Elaeagnus angustifolia *Russian Olive*	143	93	36	55	Oakland *Bloomfield Hills*	4700 Heather Lane. 15 mile Rd. Between Franklin and Inkster		
Elaeagnus angustifolia *Russian Olive*	**170**	**100**	**57**	**52**	**Eaton** *SW of Surfield*	**2 mi S of Grand Ledge Rd J. Buren Res.**	**Paul Thompson**	
Euonymus alata *Winged Euonymus*	**34**	**10**	**16**	**32**	**Lenawee** *Adrian*	**Oakwood Cemetery**	**Paul Thompson**	
Euonymus atropurpurea *Burning Bush*	65	22	35	33	Oakland *Burmingham*	Flood plain, Manor and Brookdale	Paul Thompson	
Euonymus atropurpurea * *Burning Bush*	**113**	**60**	**45**	**33**	**Wayne** *Elizabeth Park*		**Paul Thompson**	
Euonymus atropurpurea *Burning Bush*	53	16	33	16	Washtenaw *Ann Arbor*	730 Country Club Drive Near shop & #16 Green	R. Pomorski & G. McPherson	2005
Euonymus europaea *Spindle Tree*	51	19	27	20	Wayne *Inkster*	Pk. Lower R. Parkway	H.J. Neff	1970
Euonymus europaea *Spindle Tree*	**118**	**65**	**45**	**33**	**Wayne** *Trenton*	**Elizabeth Park**	**Paul Thompson**	
Euonymus europaea *Spindle Tree*	62	30	23	37	Ingham *Michigan State University*	NW corner of Olin N42°43′1.75″-W84°28′47.54″	Robert Bloye	2003
Fagus grandifolia *American Beech*		191			Lenawee *Clinton*	Edgar St. Riverside Cemetery	E. Pratt	1998

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Fagus grandifolia ***American Beech***	**318**	**193**	**98**	**106**	**Manistee** ***Onekema***	**9017 Clark Rd.** **Above Portage Point Drive**	**Elwood B. Ehrle**	**1995**
Fagus grandifolia *American Beech*	237	142	70	100	Ottawa *Allendale*	10986 60th Ave.	L. Groenink	1995
Fagus grandifolia var. pendula ***American Weeping Beech***	**120**	**42**	**66**	**48**	**Kalamazoo** ***3.2 mi NE of Richland***	**10788 W Gull Rd. (M-43)** **Jim DiLoretto property**	**Elwood B. Ehrle** **M. Halverson**	**2001**
Fagus sylvatica *European Beech*	281	170	87	95	Oakland *Cranbrook Inst. Science*	SW of Kingswood Lake N42°34′15.164″-W83°14′52.188″	Robert Bloye	2003
Fagus sylvatica *European Beech*	258	136	101	85	Ingham *Michigan State University*	N of Clock Tower N42°43′59.76″-W84°28′55.54″	Robert Bloye	2003
Fagus sylvatica ***European Beech***	**326**	**205**	**102**	**74**	**Kalamazoo** ***Kalamazoo***	**409 Stuart Ave.**	**Stu Bassett**	**2004**
Fagus sylvatica cv Spatheana *Spaeth European Beech*	107	46	53	32	Ingham *Michigan State University*	N42°44′4.68″-W84°49′17.46″	Robert Bloye	2003
Fagus sylvatica var. atropunicea *Copper Beech*					Kalamazoo. *Gull Lake* *Kellogg Biological Station*	SW corner of Stack Bldg. N42°24.243′-W85°24.053′	Stu Bassett & Robert Bloye	2004
Fagus sylvatica var. atropunicea ***Copper Beech***	**292**	**188**	**86**	**72**	**Jackson** ***Jackson***	**N Blackstone and** **Van Buren Streets**	**B. McKenzie**	**1997**
Fagus sylvatica var. atropunicea *Copper Beech*	252	134	86	127	Leelenau *Northport*	Main and Waukazoo. At Gift Shop	Elwood B. Ehrle	1993
Fagus sylvatica var. atropunicea *Copper Beech*	278	156	101	84	Sanilac *Lexington*	Huron Ave. Funeral Home near Union Rd.	Paul Thompson	

Fagus sylvatica var. heterophylla ***Fern Leaved Beech***	**226**	**132**	**78**	**62**	**Manistee** ***Manistee***	**429 2nd St. N44°14.688′-W86°19.525′**	**E. Feenstra & Elwood B. Ehrle**	**2004**
Fagus sylvatica var. laciniata *European Cut Leaf Beech*	124	60	51	50	Ingham *Michigan State University*	Between Music School and Clock Tower. N 42°43′57.21″-W84°29′0.44″	Robert Bloye	2003
Fagus sylvatica var. laciniata *European Cut Leaf Beech*	134	64	52	70	Wayne *Northville*	Bennett Arboretum Forks below 4.5 feet	R. Pomorski G. McPherson	2005
Fagus sylvatica var. laciniata ***European Cut Leaf Beech***	**241**	**178**	**51**	**48**	**Kalamazoo** ***Kalamazoo***	**229 Stuart Ave.**	**Stu Bassett**	**2004**
Fagus sylvatica var. pendula *European Weeping Beech*	132	78	45	35	Kalamazoo *Kalamazoo*	Bronson Park. Near corner of South & Park St. N42°17.397′-W85°35.223′	Elwood B. Ehrle	2004
Fagus sylvatica var. pendula *European Weeping Beech*	144	69	64	42	Ingham *Michigan State University*	W side of Library N42°43′52.07″-W84°49′2.53″	Robert Bloye	2003
Fagus sylvatica var. pendula ***European Weeping Beech***	**238**	**129**	**86**	**90**	**Oakland** ***Pontiac***	**Franklin & W Huron**	**Elwood B. Ehrle**	**2005**
Fagus sylvatica var. purpurea ***European Purple Leaf Beech***	**101**	**48**	**42**	**44**	**Ingham** ***Michigan State University***	**Between Library and fountain N42°43′52.84″-W84°29′0.66″**	**Robert Bloye**	**2003**
Fagus sylvatica var. tricolor ***Tricolor Beech***	**140**	**72**	**55**	**50**	**Kalamazoo** ***Kalamazoo***	**Bronson Park—near corner of Academy and Church Streets N42°17.440′-W85°35.164′**	**Elwood B. Ehrle**	**2004**
Fraxinus americana *White Ash*	358	243	100	61	Antrim *S of Elk Rapids*	11347 Hanel Rd.	Elwood B. Ehrle	1995
Fraxinus americana *White Ash*	358	245	92	85	Livingston *Near Ann Arbor*	8 mile road. 2+ mi W of Pontiac Trail . N42°25.806′-W83°42.057′	Elwood B. Ehrle R. Pomorski	2003

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Fraxinus americana ***White Ash***	**403**	**247**	**131**	**99**	**Leelanau.** ***Off M-22 Sleeping Bear Dunes Park***	**Near Glen Arbor on trail .** **Contact N. Lapinski** **(231)933-8400**	**N. Lapinski &** **R. Pomorski**	**2004**
Fraxinus americana *White Ash*	327	202	101	96	Sanilac *Lexington*	3 mi S on Lake Harm 7262 Lakeville Rd.	Paul Thompson	1985
Fraxinus nigra * ***Black Ash***	**176**	**96**	**72**	**33**	**Lenawee** ***Adrian***	**N of Island Park. Sect. 23** **N. Sycamore**	**R.W. Smith**	**1981**
Fraxinus nigra *Black Ash*	168	93	67	32	Ontonagon *Bergland—Crystal Falls*	T48N,R42, Sect. 28	Steve Van Buren	1972
Fraxinus pennsylvanica *Green Ash*	306	212	75	76	Oakland *Berkley*	2414 Columbia St.	Paul Thompson Joe Kaplan	1971 1997
Fraxinus pennsylvanica *Green Ash*	290	165	97	111	Oakland *Bloomfield Hills*	1222 W Long Lake Contact Judith Darin 645-5890	Paul Thompson	
Fraxinus pennsylvanica *Green Ash*	296	160	111	100	Wayne *Grosse Ile*	21803 W River Rd.	Paul Thompson	1972
Fraxinus pennsylvanica * ***Green Ash***	**393**	**271**	**96**	**104**	**Cass** ***N of Dowagiac***	**Topash and Townline Rd.** **N42.04196°-86.616603°**	**Elwood B. Ehrle** **Andrew &** **Noah Sawyer**	**1992** **2006**
Fraxinus quadrangulata *Blue Ash*	141	74	56	44	Ingham *Michigan State University*	W side of Campbell Hall	Joe Kaplan	1996
Fraxinus quadrangulata *Blue Ash*	157	77	69	45	Ingham *Michigan State University*	W of Campbell Hall N42°44′5.55″-W84°29′8.32″	Robert Bloye	2003
Fraxinus quadrangulata ***Blue Ash***	**281**	**99**	**155**	**108**	**Lenawee** ***Adrian***	**N of Island Park—Sect. 23**	**R. Smith &** **Paul Thompson**	**1983**
Fraxinus profunda ***Pumpkin Ash***	**233**	**85**	**135**	**50**	**Wayne** ***Belle Isle***	**In woods off Central Ave.** **Original ID by Herb Wagner**	**S. Campbell &** **Elwood B. Ehrle**	**2001**

Fraxinus profunda *Pumpkin Ash*		67			Wayne Bell Isle	Bicycle Trail, N bank of Nashua Canal	S. Campbell & W. Herb Wagner	1998
Ginkgo biloba ***Ginkgo***	**243**	**123**	**94**	**102**	**Monroe** ***Monroe***	**127 Hollywood Drive**	**H.J. Neff**	**1970**
Ginkgo biloba *Ginkgo*	214	120	77	69	Monroe *Monroe*	W Elm & Catholic Central High School	H.J. Neff	1970
Ginkgo biloba *Ginkgo*	218	124	80	57	Ingham *Michigan State University*	E of Clock Tower N42°43′55.13″-W84°28′57.57″	Robert Bloye	2003
Ginkgo biloba ***Ginkgo***	**242**	**147**	**80**	**60**	**Hillsdale** ***Hillsdale***	**Public Library**	**Matt Spletzer & Elwood B. Ehrle**	**1993**
Gleditsia triacanthos *Honey Locust*	252	155	85	49	Washtenaw *W of Ann Arbor*	Knight Rd. between Liberty & Scio Church	H.J. Neff	1966
Gleditsia triacanthos *Honey Locust*	262	167	75	79	St. Clair *3 mi SW of St. Clair*	5771 Meisner Rd.	Richard Jaronski	1989
Gleditsia triacanthos ***Honey Locust***	**320**	**227**	**78**	**60**	**Wayne** ***Grosse Ile***	**24532 E River Rd.**	**R. Pomorski**	**2004**
Gleditsia triacanthos var. inermis *Thornless Honey Locust*	307	150	130	106	Washtenaw *S of Ypsilanti*	8145 Stoney Creek Rd.	Dale Prinick	
Gledtsia triacanthos var. inermis *Thornless Honey Locust*	250	132	100	70	Wayne *Detroit*	275 W Grand Boulevard	Paul Thompson	1976
Gleditsia triacanthos var. inermis * ***Thornless Honey Locust***	**340**	**198**	**116**	**104**	**Lenawee** ***W of Adrian***	**S edge of M-34, E of Seneca Rd.**	**R. Smith & Paul Thompson**	**1985**
Gleditsia triacanthos var. inermis *Thornless Honey Locust*	289	145	112	128	Wayne *Grosse Pte. Shores*	City Hall, Lake Drive near Vernor	Tom Jeffries & Paul Thompson	

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Gleditsia triacanthos var. inermis *Thornless Honey Locust*	144	58	76	40	Ingham *Michigan State University*	E side of Administration Building N42°43′46.78″-W84°28′52.02″	Robert Bloye	2003
Gymnocladus dioicus *Kentucky Coffee Tree*	212	104	93	61	Macomb *Utica*	8280 Clinton River Drive	Ed. Sturmer	
Gymnocladus dioicus ***Kentucky Coffee Tree***	**308**	**169**	**112**	**109**	**Van Buren** ***Hartford***	**409 Haver**	**Paul Thompson**	
Gymnocladus dioicus *Kentucky Coffee Tree*	236	127	94	60	Lenawee *Morenci*	City Park. By tennis courts . E side of main road. N41°43′11.012″-W84°13′23.354″	S. Bassett & Robert Bloye	2004
Gymnocladus dioicus *Kentucky Coffee Tree*	214	111	88	61	Lenawee *Morenci*	City Park. By tennis courts. N41°43′11″-W84°13′23″	M. Nielson Robert Bloye	2004
Hamamelis virginiana ***Witch-Hazel***	**70**	**17**	**43**	**41**	**Muskegon** ***Muskegon State Park***	**E trail of Deep Valley**	**Paul Thompson**	**1974**
Hamamelis virginiana *Witch-Hazel*	60	15	39	23	Oakland *Franklin*	Franklin Ravine. N of 14 mi W edge of stream	Paul Thompson	1986
Ilex opaca *American Holly*	36	12	22	8	Ingham *Michigan State University*	Beal Gardens	Duane McKenna E. Chittenden	1996
Ilex opaca ***American Holly***	**57**	**27**	**25**	**20**	**Macomb** ***Mt. Clemens***	**114 N. North Ave.**	**Kniper**	**1989**
Ilex verticillata ***Michigan Holly***	**42**	**7**	**33**	**8**	**Van Buren** ***N of Decatur***	**Swamp, 2 mi S of I-94 on M-40**	**Paul Thompson**	**1965**
Juglans cinerea *Butternut*	285	178	84	92	Allegan *NW of South Haven*	64th St. Elmhurst Farm N42°37.868′-W86°10.129′	Elwood B. Ehrle	2003

Juglans cinerea *Butternut*	308	179	96	130	Sanilac *Lexington*	7225 Simion St. Ed Shipley residence	Paul Thompson	1985
Juglans cinerea ***Butternut***	**314**	**189**	**103**	**86**	**Hillsdale** ***NW of Hudson***	**1389 Culbert Rd.**	**Paul Thompson**	**1989**
Juglans cinerea *Butternut*	282	173	84	98	Kent *Hopkins*	2461 22nd St.	Paul Thompson	1988
Juglans nigra *Black Walnut*	367	261	81	101	Oakland *Northville*	22047 Novi Rd. S of 9 mile	W. Johnson Joe Kaplan	1996
Juglans nigra ***Black Walnut***	**417**	**266**	**121**	**119**	**Kalamazoo** ***Kalamazoo***	**6565 W H Ave.**	**E. & R. Kavelman**	**1997**
Juglans nigra *Black Walnut*	387	246	110	124	Lenawee *Clinton*	41201 Little Rd.	J. Prescott	1995
Juglans nigra *Black Walnut*	351	214	113	96	Antrim *N of Eastport*	½ mi N of junction of M-88 & U.S. 31	John Spencer Paul Thompson	1988
Juglans nigra *Black Walnut*	357	247	79	124	Macomb *Clinton*	41201 Little Rd. Remeasured by Joe Kaplan, 1997	J.C. Prescott & T. Grant	1995
Juglans nigra *Black Walnut*	362	227	107	111	Oakland *West Bloomfield*	36310 W 14 mi Rd.between Drake and Halstead Roads	Paul Thompson	1983
Juglans nigra *Black Walnut*	336	245	67	96	Oceana *Crystal Township*	T16N-R16W Sect. 21. NE ¼ NE ¼. M. Whitaker 873-3267	S. Snell	1998
Juglans regia *English Walnut*	157	89	50	70	Washtenaw *Ann Arbor*	2815 Brockman	AA Big Tree Registry	1995
Juglans regia ***English Walnut***	**227**	**150**	**58**	**75**	**Mason** ***Ludington***	**4330 S Morton Rd N43°52.561′-W86°21.468′ ½ mi S of Kistler Rd**	**Elwood B. Ehrle**	**2004**
Juniperus communis * ***Common Juniper***	**90**	**37**	**46**	**28**	**Washtenaw** ***5 mi N of Chelsea***		**M. Heumann & Paul Thompson**	

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Juniperus communis var. depressa ***Ground Juniper***	**37**	**17**	**18**	**8**	**Leelenau** ***Glen Haven***	**Near Sleeping Bear Dunes**	**Paul Thompson**	**1965**
Juniperus communis var. depressa ***Ground Juniper***	**35**	**23**	**9**	**12**	**Leelenau** ***S.Manitou Island***	**NW of old dock**	**Andrew and Noah Saywer**	**2006**
Juniperus virginiana *Eastern Red-Cedar*	157	99	51	27	Oakland *Wixom*	Wixom Cemetery Wixom & Maple Rds.	Joe Kaplan	1997
Juniperus virginiana ***Eastern Red-Cedar***	**186**	**113**	**66**	**28**	**Ionia** ***Portland St. Game Area***	**Along river bank** **N42°48.931′-W84°56.043′**	**Tony Reznicek** **Elwood B. Ehrle**	**2003**
Juniperus virginiana *Eastern Red-Cedar*	122	56	61	21	Ionia *S of Portland*	W bank of river SW corner of Towner & Pohl	Paul Thompson	1988
Juniperus virginiana *Eastern Red-Cedar*	142	81	50	44	Grand Traverse *NW of Williamston*	Cram Rd, across from 7409	H. Harvey Joe Kaplan	1962 1996
Juniperus virginiana var. burki **Burk Red-Cedar**	**81**	**33**	**45**	**10**	**Ingham** ***Michigan State University***	**SE corner of Auditorium** **N42°43′43.182″-W84°28′34.489″**	**Robert Bloye**	**2003**
Koelreuteria paniculata ***Golden Rain Tree***	**115**	**55**	**48**	**49**	**Ingham** ***Michigan State University***	**Between Music Bldg. & garden, E of sidewalk.** **N42°43′53.90″-W84°29′4.83″**	**Robert Bloye**	**2003**
Larix decidua ***European Larch***	**231**	**124**	**84**	**90**	**Lenawee.** ***0.3 mi NE of Macon***	**Macon Rd**	**D. Minick**	
Larix decidua *European Larch*	199	103	78	70	Branch *W of Coldwater*	W of Jay St. (RR)	H.J. Neff	1968
Larix decidua *European Larch*	172	102	57	53	Branch *W of Quincy*	Between Ridge Rd. & US-112	H.J. Neff	1969

Larix decidua *European Larch*	205	102	88	58	Lenawee E of Hudson	M-34 N, RR, W of Posey Lake Rd	Paul Thomposon	1975
Larix larcina *Eastern Tamarack*	181	52	123	24	Oceana *Hesperia*	3580 E Pierce Rd. 60 ft. E and 50 ft. N of Osborn Creek and E. Pierce Road	Bruce Dutcher	2001
Larix larcina ***Eastern Tamarack***	**214**	**109**	**89**	64	**Lake** ***Luther***	**Pond, 1 mi. E, end of road**	**J. Buerge**	
Lindera benzoin ***Spicebush***	**38**	**10**	**23**	**18**	**Wayne** ***Detroit***	**Belle Isle Nature Center. Vista Ave.**	**H.J. Neff**	**1965**
Liquidambar styraciflua *Sweetgum*	128	54	61	50	Wayne *Detroit*	Fairgrounds, N entrance	J. Baker	
Liquidambar styraciflua *Sweetgum*	135	62	59	54	Wayne *Detroit*	Woodmere Cemetery	J. Baker	
Liquidambar styraciflua *Sweetgum*	120	56	53	43	Oakland *Bloomfield Hills*	33 Lone Pine Rd	Paul Thompson	1977
Liquidambar styraciflua *Sweetgum*	176	81	82	54	Calhoun *Battle Creek*	Irvine Park. N42°19.874′-W85°11.006′	Jeff Boddy & Elwood B. Ehrle	2005
Liquidambar styraciflua ***Sweetgum***	**198**	**81**	**100**	**66**	**Kalamazoo** ***Kalamazoo***	**Western Michigan University 35 yards ENE of the Oaklands N42°17.025′-W85°36.665′**	**Elwood B. Ehrle**	**2005**
Liriodendron tulipifera *Tuliptree/Yellow Poplar*	367	239	105	90	Wayne *Lower Huron Metro Park*	Tuliptree Trail	DMC Niven & A. Abdo	1989
Liriodendron tulipifera *Tuliptree/Yellow Poplar*	282	164	98	78	Kalamazoo *E of Kalamazoo*	7418 S 31st St	Elwood B. Ehrle	1996
Liriodendron tulipifera *Tuliptree/Yellow Poplar*	360	143	184	132	Berrien *Warren Woods, East*	N of River Bend	Paul Thompson	1976

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Liriodendron tulipifera ***Tuliptree/Yellow Poplar***	**403**	**178**	**192**	**133**	**Branch** ***2 mi N of Quincy***	**Elmer Dobson Farm**	**Paul Thompson**	**1979**
Liriodendron tulipifera *Tuliptree/Yellow Poplar*	299	170	106	91	Wayne *Flatrock*	Church next to 24350 Huron River Drive	H.J. Neff	1968
Liriodendron tulipifera *Tuliptree/Yellow Poplar*	348	201	126	82	Berrien *St. Joseph*	50 yds S. of St. Joseph H.S. Field House. N42.088–W86.492	Andrew and Noah Sawyer	2006
Maclura pomifera *Osage Orange*		173			Ionia *Lake Odessa*	Big Tree Contest	Beverly McDiarmid	2002
Maclura pomifera *Osage Orange*	229	168	50	45	Berrien *Coloma*	Edge of town. Hedgerow (Couldn't find it – EBE 10/05)	C. Nelson	1973
Maclura pomifera *Osage Orange*	237	135	85	69	Van Buren *Hartford*	S East St., S of Highway (Old US-12). 202 East Main St	H.J. Neff	1971
Maclura pomifera *Osage Orange*	247	161	70	64	Wayne *Detroit*	Bonnie Brook Country Club Food Inst. Alumni House	Paul Thompson	1990
Maclura pomifera ***Osage Orange***	**268**	**172**	**75**	**82**	**Kalamazoo** ***N of Richland***	**Off West Gull Lake Drive, 2-track On Woody Boudeman Farm. N42°24.308′-W85°26.656′5**	**Russ Shipper Elwood B. Ehrle**	**2005**
Magnolia acuminata ***Cucumber Magnolia***	**252**	**164**	**70**	**75**	**Berrien** ***Bertrand Tpwnship***	**3110 Spirea Rd**	**Elwood B. Ehrle**	**1993**
Magnolia acuminata *Cucumber Magnolia*	210	121	72	69	Jackson *Jackson*	Mount Evergreen Cemetery	G.D.Small	
Magnolia acuminata *Cucumber Magnolia*	208	97	92	77	Wayne *Detroit*	Woodmere Fort & Cemetery Section M	H.J. Neff	1970
Magnolia acuminata *Cucumber Magnolia*	202	118	66	71	Lenawee *Adrian*	Oakwood Cemetery East Section 7	H.J. Neff & Paul Thompson	1975

Magnolia acuminata *Cucumber Magnolia*	**257**	**138**	**99**	**81**	**Lenawee** *Adrian*	**225 N Toledo St. Tree is 90+ years old**	**V. Anderson**	
Magnolia salicifolia *Anise Magnollia*	70	41	21	33	Ingham *Michigan State University*	SE of Cowles House N42°43′58.34″-W84°29′3.42″	Robert Bloye	2003
Magnolia salicifolia *Anise Magnolia*	**96**	**30**	**58**	**32**	**Ingham** *Michigan State University*	**West bank of Beal Gardens N42°43′53.82″-W84°29′4.05″**	**Robert Bloye**	**2003**
Magnolia stellata cv Royal Star. *Star Magnolia*	**26**	**10**	**12**	**16**	**Ingham** *Michigan State University*	**SE corner of circle in Beal Gardens. N42°43′52.76″-W84°29′8.97″**	**Robert Bloye**	**2003**
Magnolia tripetala *Umbrella Magnolia*		37			Jackson *Jackson*	Van Buren & Blackstone Jackson County Big Tree	Sharon Parker	1997
Magnolia ×loebneri *Loebner Magnolia.* **=M. kobus var. loebneri cv Merrill**	**36**	**13**	**17**	**23**	**Ingham** *Michigan State University*	**S of Student Services Building N42°43′54.98″-W84°28′35.99″**	**Robert Bloye**	**2003**
Magnolia ×loebneri c.v. Merrill *Merrill Magnolia*	**68**	**29**	**31**	**30**	**Ingham** *Michigan State University*	**N of Cowles House N42°44′0.98″-W84°29′4.02″**	**Robert Bloye**	**2003**
Magnolia ×soulangeana *Saucer Magnolia*	75	41	26	32	Washtenaw *Ann Arbor*	312 S. Division	AA Big Tree Registry	1995
Magnolia ×soulangeana *Saucer Magnolia*	**106**	**51**	**38**	**66**	**Berrien** *Berrien Springs*	**114 N. Kimmel St**	**D. Woodland & L. Steil**	**2002**
Malus 'Bob White' *Bob White Crabapple*	57	27	22	33	Ingham *Michigan State University*	E of Circle, Beal Gardens N42°43′53.53″-W84°29′7.03″	Robert Bloye	2003
Malus 'Mary Potter' *Mary Potter Crabapple.* =Malus ×atrosanguinea × M.sargentii var. rosea	40	18	14	30	Ingham *Michigan State University*	NW corner of Olin N42°44′1.77″-W84°28′46.84″	Robert Bloye	2003

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Malus angustifolia ***Southern Crabapple***	**46**	**20**	**18**	**33**	**Wayne** ***Cass Benton Park***	**1 mi S of 7 mi Rd** **300 feet W of E Hines Drive**	**H.J. Neff**	**1966**
Malus coronaria ***Crabapple***	**62**	**26**	**28**	**33**	**Wayne** ***Plymouth***	**Middle Rouge Parkway** **Comfort Stat. Near Haggerty Rd**	**H.J. Neff**	**1966**
Malus coronaria ***Crabapple***	**67**	**22**	**38**	**28**	**Wayne** ***Detroit***	**Middle Rouge Parkway.** **Comfort Station at Springbrook**	**H.J. Neff**	**1966**
Malus floribunda ***Japanese Flowering Crabapple***	**50**	**30**	**13**	**28**	**Ingham** ***Michigan State University***	**Between Olds Hall &** **Admin. Building.** **N42°43′49.60″-W84°28′52.30″**	**Robert Bloye**	**2003**
Malus fusca ***Oregon Crabapple***	**101**	**43**	**45**	**53**	**Ingham** ***Michigan State University***	**Beal Gardens,** **SW corner of library.** **N42°43′51.22″-W84°29′2.57″**	**Robert Bloye**	**2003**
Malus hupehensis ***Tea Crabapple***	**35**	**13**	**16**	**22**	**Ingham** ***Michigan State University***	**W side of Williams House** **42°44′2.64″-W84°29′18.57″**	**Robert Bloye**	**2003**
Malus ioensis *Prairie Crabapple* *Labelled Bechtel Crab*	46	17	20	35	Wayne *Cass Benton Park*	1 mi S of 7 Mi Rd. 300 feet W of E.Hines Drive.	H.J. Neff	1966
Malus ioensis * ***Prairie Crabapple***	**151**	**88**	**46**	**68**	**Oakland** ***Beverly Hills***	**17503 Kirkshire**	**Paul Thompson** **Joe Kaplan**	**1971** **1997**
Malus pumila ***Common Apple***	**178**	**138**	**31**	**34**	**Oakland** ***Bloomfield Hills***	**Telegraph & W Quarton Rds**	**Joe Kaplan** **Paul Thompson**	**1980** **1997**
Malus sieboldii var. Zuni **′calocarpa′-** **Redbud Crabapple**	**43**	**19**	**17**	**28**	**Ingham** ***Michigan State University***	**S side of Williams Hall** **N42°44′1.68″-W84°29′18.11″**	**Robert Bloye**	**2003**

Malus sylvestris ***Common Apple***	**186**	**122**	**52**	**48**	**Oakland** ***Bloomfield Hills***	**4359 Oak Grove, Wing Lake**	**Paul Thompson**	**1992**
Malus ×Barbara Ann ***Barbara Ann Crabapple***	**33**	**12**	**15**	**25**	**Ingham** ***Michigan State University***	**Gardner's shed at Beal Gardens** **N42°43′50.85″-W84°29′4.91″**	**Robert Bloye**	**2003**
Malus ×scheideckeri **=M. floribunda** **× M. prunifolia** ***Scheideckeri Crabapple***	**58**	**31**	**20**	**26**	**Ingham** ***Michigan State University***	**Between Student Services and Old Horticulture Building** **N42°43′56.84″-W84°28′35.39″**	**Robert Bloye**	**2003**
Metasequoia glyptostroboides *Dawn Redwood*	147	79	58	38	Manistee *Manistee*	Lake Bluff Audubon Building 2890 Lakeshore Drive	Elwood B. Ehrle	1995
Metasequoia glyptostroboides *Dawn Redwood*		118			Oakland *Bloomfield Hills*	Big Tree Contest	Marsha Suszan	2002
Metasequoia glyptostroboides ***Dawn Redwood***	**233**	**117**	**104**	**46**	**Ingham** ***Michigan State University***	**Beal Gardens – W side** **N42°43′53.45″-W84°29′5.07″**	**Robert Bloye**	**2003**
Morus alba *White Mulberry*	177	121	44	46	Allegan *Allegan*	120 Kalamazoo St On River bank near end of street	J. Stapleton	1995
Morus alba *White Mulberry*	298	193	82	93	Kalamazoo *W of Battle Creek*	NW corner of B Ave. and Kalamazoo County line	Martens & Paul Thompson	
Morus alba ***White Mulberry***	**348**	**252**	**76**	**79**	**Lenawee** ***E of Morenci***	**5600 E Mulberry,** **0.5 mi E of Pense**	**Paul Thompson**	1981
Morus alba *White Mulberry*	284	223	45	63	Kalamazoo Gull Lake	Kellogg Biological Station	Stu Bassett	1989
Morus alba var. pendula ***Weeping White Mulberry***	**84**	**60**	**20**	**16**	**Allegan** ***NW of South Haven***	**Elmhurst Farm, 64th St** **N42°27.871′-W86°10.114′**	**Elwood B. Ehrle**	**2003**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Morus rubra ***Red Mulberry***	**312**	**247**	**49**	**63**	**Berrien** ***St. Joseph***	**Behind 849 Lewis Ave.** **N 42.098°×W86.484°**	**Andrew and Noah Sawyer**	**2006**
Morus rubra *Red Mulberry*	281	203	58	80	Shiawassee *Linden*	743 W Broad St	Paul Thompson	1976
Nemopanthus mucronatus *Mountain Holly*	30	10	18	6	Oakland *Highland*	Fish Lake Bog	Paul Thompson	1960
Nemopanthus mucronatus *Mountain Holly*	24	7	14	12	Leelenau *N of Glen Arbor*	SW corner of Lost Lake	Paul Thompson	1962
Nemopanthus mucronatus * ***Mountain Holly***	**36**	**13**	**20**	**10**	**Oakland** ***Highland***	**Fish Lake Bog**	**Paul Thompson**	**1960**
Nyssa sylvatica *Tupelo*	198	104	80	55	Wayne *Allen Park*	Oakwood Blvd. W of I-94	H.J. Neff	1969
Nyssa sylvatica ***Tupelo***	**237**	**140**	**77**	**80**	**Cass** ***Marcellus***	**Near Wright and Burlington Rds**	**L. Lewis**	**1964**
Nyssa sylvatica *Tupelo*	187	103	70	56	Macomb *S of Haupt*	4885 37 Mile Rd	Paul Thompson	1964
Ostrya virginiana *Ironwood/Eastern Hophornbeam*	186	115	55	63	Clare *Farwell*	3411 Maradee Court. Across street, near center of orchard	Andrew and Noah Sawyer	2006
Ostrya virginiana *Ironwood/Eastern Hophornbeam*	175	84	78	51	Charlevoix *Beaver Island*	27277 Darkeytown Rd	Rod Nackerman	2001

Ostrya virginiana * ***Ironwood/Eastern Hophornbeam***	**195**	**115**	**70**	**40**	**Grand Traverse** ***S of Monroe Center***	**0.3 mi W of 633 on N side of Miller Rd. Entire left half is dead. Former National champion. Points drop from 217 to 195. N44°35.088′-W85°42.110′**	**Elwood B. Ehrle**	**2004**
Phellodendron amurense *Amur Cork Tree*	77	22	50	18	Cass *NE of Cassopolis*	Edward Lowe Foundation Near road in area 53. N41°07.064′-W85°59.609′	Dennis Woodland& & Elwood B. Ehrle	2002
Phellodendron amurense ***Amur Cork Tree***	**178**	**88**	**71**	**76**	**Ingham** ***Michigan State University***	**Middle of Beal Gardens N42°43′52.52″-W84°29′5.64″**	**Robert Bloye**	**2003**
Picea abies *Norway Spruce*	243	132	92	76	Grand Traverse *Old Mission Peninsula*	SW of intersection of Peninsula Drive and Old Mission Rd	John Spencer	1986
Picea abies *Norway Spruce*		158			Kalamazoo *Kalamazoo*	2019 Douglas Ave	Elwood B. Ehrle	2004
Picea abies ***Norway Spruce***	**281**	**170**	**93**	**71**	**Ottawa** ***Spring Lake***	**18201 Fruitport Rd**	**Elwood B. Ehrle Doug Knight**	**2002**
Picea abies *Norway Spruce*	267	175	75	67	Jackson *Parma*	9498 County Farm Rd	Elwood B. Ehrle Stephen Johnson	2002
Picea abies *Norway Spruce*	263	145	98	78	Oakland *Novi*	21937 Novi Rd, S of 9 mile Rd	Paul Thompson	1960
Picea glauca ***White Spruce***	**229**	**104**	**117**	**26**	**Gogebic** ***Sylvania Wilderness Area***	**S end of Mule Lake, 100′N of Rd. N46°12.899′-W89°23.130′**	**Michael Neal**	**2001**
Picea glauca *White Spruce*		110			Montmorency *Hillman Twp*	22750 Theiner Trail Big Tree Hunt	R. Theiner	1997
Picea glauca ***White Spruce***	**232**	**132**	**90**	**40**	**Cheboygan** ***Cheboygan***	**11311 Schmidt Rd. In woods behind farmhouse at N45°37.504′-W84°32.389′**	**Wayne Spray & Elwood B. Ehrle**	**2005**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Picea glauca × P. pungens ***Spartan Spruce***	**85**	**34**	**46**	**18**	**Ingham** ***Michigan State University***	**E of Cowles house, beyond drive-way.** **N42°43′59.47″×W84°29′3.07″**	**Robert Bloye**	**2003**
Picea mariana ***Black Spruce***	**130**	**57**	**63**	**39**	**Isabella** ***S of Farwell, Bilmore Twp.***	**0.4 mi S of Heritage Rd, Sect. 10**	**CVA**	**1964**
Picea omorika ***Serbian Spruce***	**69**	**28**	**37**	**15**	**Ingham** ***Michigan State University***	**N side of Adam's Field, N of Intermural Circle.** **N42°44′0.35″-W84°29′7.52″**	**Robert Bloye**	**2003**
Picea pungens *Colorado Blue Spruce*		96			Oakland *Rochester Hills*	Big Tree Contest	D. McCuen & R. Bloomingdale	2002
Picea pungens *Colorado Blue Spruce*	109	47	58	15	Ingham *Michigan State University*	NE corner of Williams House N42°44′4.80″-W84°29′17.06″	Robert Bloye	2003
Picea pungens ***Colorado Blue Spruce***	**176**	**96**	**70**	**40**	**Wexford** ***Cadillac***	**Maple Hill Cemetery. Bus 131 N** **N44°14.149′-W85°23.749′**	**Elwood B. Ehrle**	**2005**
Pinus aristata ***Bristlecone Pine***	**20**	**9**	**9**	**9**	**Ingham** ***Michigan State University***	**E of Psychology Research Bldg.** **N42°43′45.369″-W84°28′21.957″**	**Robert Bloye**	**2003**
Pinus banksiana *Jack Pine*	169	93	68	30	Marquette *16 mi S of Marquette*	W Branch of Escanaba River	Bruce Spike & Elwood B. Ehrle	1993
Pinus banksiana ***Jack Pine***	**179**	**97**	**70**	**48**	**Iron** ***Iron River***	**T42N-R32W, sect. 28, SW ¼, SE ¼**	**Gerald Devine** **DNR Crystal Falls**	**1980**
Pinus banksiana *Jack Pine*	145	72	64	37	Cheboygan *Indian River*	Lake & Pine Sts Hopke residence	H.J. Neff	1970
Pinus cembra ***Swiss Stone Pine***	**80**	**42**	**31**	**28**	**Ingham** ***Michigan State University***	**Between Museum and Agriculture Hall.** **N42°43′52.34″-W84°28′51.27″**	**Robert Bloye**	**2003**

Pinus contorta var. latifolia *Lodge-Pole Pine*	**63**	**36**	**23**	**17**	**Ingham** *Michigan State University*	**Curbside between museum and Agriculture Hall. Slanted at 35° 42°43′51.88″-W84°28′51.28″**	**Robert Bloye**	**2003**
Pinus densiflora *Japanese Red Pine*	**88**	**40**	**41**	**29**	**Ingham** *Michigan State University*	**SW of Cowles House N42°43′57.39″-W84°29′5.79″**	**Robert Bloye**	**2003**
Pinus densiflora *Japanese Red Pine*	74	20	47	26	Ingham *Michigan State University*	N of Morrill Hall N42°43′53.33″-W84°28′49.31″	Robert Bloye	2003
Pinus densiflora *Japanese Red Pine*	56	29	21	22	Ingham *Michigan State University*	SW corner of Olin N42°43′59.51″-W84°28′47.02″	Robert Bloye	2003
Pinus densiflora var. umbraculifera *Japanese Umbrella Pine*	**62**	**25**	**31**	**25**	**Ingham** *Michigan State University*	**W side of library. N42°43′52.37″-W84°29′3.14″**	**Robert Bloye**	**2003**
Pinus flexilis *Limber Pine*	124	68	49	28	Ingham *Michigan State University*	N42°44′3.18″-W84°29′23.10″ NW of Williams Hall	Robert Bloye	2003
Pinus flexilis *Limber Pine*	**214**	**136**	**66**	**46**	**Calhoun** *Leila Arboretum*	**N42°20.267′-W85°12.636′**	**Jeff Boddy & Elwood B. Ehrle**	**2005**
Pinus jeffreyi *Jeffrey Pine*	**150**	**79**	**60**	**42**	**Ingham** *Michigan State University*	**N42°44′5.42″-W84°29′1.03″ NW corner of Union**	**Robert Bloye**	**2003**
Pinus mugo *Mugo Pine*	**47**	**19**	**18**	**39**	**Ingham** *Michigan State University*	**NE corner of Administration Bldg. N42°43′47.19″-W84°28′51.52″**	**Robert Bloye**	**2003**
Pinus nigra *Austrian Pine*	207	119	73	59	Grand Traverse *Traverse City*	State Hospital grounds	Elwood B. Ehrle	1995
Pinus nigra *Austrian Pine*	159	106	38	60	Kalamazoo *Kalamazoo*	Beacon Club – Portage Rd	Elwood B. Ehrle	1996
Pinus nigra *Austrian Pine*	**213**	**138**	**65**	**40**	**Ingham** *Michigan State University*	**Across from the Student Union**	**Joe Kaplan Frank Telewski**	**1996**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Pinus nigra *Austrian Pine*		168			Lenawee *Tecumseh*	Big Tree Contest	Richard Pomorski	2002
Pinus nigra *Austrian Pine*	177	93	70	57	Kalamazoo *Gull Lake*	Kellogg Biological Station	Stu Bassett	1989
Pinus parviflora var. glauca ***Japanese White Pine***	**43**	**20**	**17**	**24**	**Ingham** ***Michigan State University***	**Library Plaza – Between Library and Museum N42°43′52.20″-W84°28′58.18″**	**Robert Bloye**	**2003**
Pinus peuce ***Macedonian Pine***	**58**	**27**	**25**	**23**	**Ingham** ***Michigan State University***	**SW of Cowles House N42°43′58.07″-W84°29′5.94″**	**Robert Bloye**	**2003**
Pinus ponderosa *Ponderosa Pine*		57			Saginaw *Burt*	Big Tree Contest	John Briggs	2002
Pinus ponderosa ***Ponderosa Pine***	**136**	**60**	**68**	**30**	**Kalamazoo** ***Kalamazoo***	**9443 N 40th St**	**Stu Bassett**	**2004**
Pinus ponderosa var. ponderosa ***Pacific Ponderosa Pine***	**126**	**64**	**51**	**44**	**Ingham** ***Michigan State University***	**SW corner of Music School N42°43′55.67″-W84°29′7.01″**	**Robert Bloye**	**2003**
Pinus resinosa *Red Pine*	255	101	141	50	Ontonagon *Porcupine Mt. State Park*	Little Carp River Trail	Paul Thompson	1971
Pinus resinosa *Red Pine*	208	101	96	45	Luce *S of County Rd 412*	Bridge over E branch of River	Paul Thompson R & B Holbrook	
Pinus resinosa * ***Red Pine***	**277**	**141**	**122**	**54**	**Gogebic** ***Watersmeet***	**Sylvania Tract. NE of Loon Lake**	**Andrew and Noah Sawyer**	**2006**
Pinus rigida ***Pitch Pine***	**69**	**34**	**32**	**11**	**Ingham** ***Michigan State University***	**NE corner of Intermural Sports West . N42°43′44.71″-W84°29′11.63″**	**Robert Bloye**	**2003**

Pinus strobiformis ***SW White Pine***	**179**	**109**	**57**	**53**	**Ingham** ***Michigan State University***	**Roadside N of Administraation Building. Mislabelled P. flexilis N42°43′50.79″-W84°28′50.41″**	**Robert Bloye**	**2003**
Pinus strobus *Eastern White Pine*	323	212	104	28	Marquette *Presque Isle Park*		H.J. Neff	1964
Pinus strobus *Eastern White Pine*	325	192	124	36	Keweenaw *2 mi S of Copper Harbor*	Estivant Pines	J. Rocke	
Pinus strobus * ***Eastern White Pine***	**363**	**200**	**150**	**53**	**Ontonagon** ***Porcupine Mt. State Park***	**Little Carp River Trail**	**R. Sprague**	**1998**
Pinus sylvestris *Scotch Pine*	222	143	64	61	Lenawee *Tipton*	Cemetery	H.J. Neff	1966
Pinus sylvestris ***Scotch Pine***	**235**	**162**	**62**	**45**	**Lenawee** ***Morenci***	**City Park. Near tennis courts. N41°43′11″-W84°13′33″**	**Mo Neilson & Robert Bloye**	**2004**
Pinus uncinata ***Giant Mugo Pine***	**54**	**24**	**21**	**34**	**Ingham** ***Michigan State University***	**SW corner of Union N42°44′3.47″-W84°29′0.84″**	**Robert Bloye**	**2003**
Pinus virginiana ***Virginia Pine***	**51**	**22**	**25**	**17**	**Ingham** ***Michigan State University***	**S of Gilchrist Hall. In Adam's Field. N42°43′59.71″-W84°29′12.51″**	**Robert Bloye**	**2003**
Pinus wallichiana ***Himalayan Pine***	**101**	**43**	**50**	**31**	**Ingham** ***Michigan State University***	**NW Corner of Morrill Hall N42°44′0.55″-W84°28′50.98″**	**Robert Bloye**	**2003**
Platanus occidentalis ***Sycamore***	**400**	**256**	**120**	**96**	**Berrien** ***Berrien Township***	**Lake Chapin Rd Overpass @ US 31**	**Dennis Woodland**	**1998**
Platanus occidentalis *Sycamore*	395	233	138	97	Kalamazoo *Kalamazoo*	E Alcott St . Lawn in front of former Stryker Building	John Pawlak & Elwood B. Ehrle	2001
Platanus occidentalis *Sycamore*	331	226	84	86	Ingham *Michigan State University*	Between Agriculture Hall and Natural Sciences Building. N42°43′51.92″-W84°28′42.49″	Robert Bloye	2003

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Platanus occidentalis ***Sycamore***	**405**	**259**	**123**	**93**	**Lenawee** ***Morenci***	**12001 Sims Highway. ¼ mi E of sewage lagoons N41°44′13.246″-W84°13′54.953″**	**William Lampe Robert Bloye**	**2004**
Platanus ×acerifolia ***London Planetree***	**232**	**121**	**96**	**61**	**Ingham** ***Michigan State University***	**NE corner of Yakeley Hall N42°44′2.77″-W84°29′10.19″**	**Robert Bloye**	**2003**
Platanus ×acerifolia *London Planetree*	189	102	72	60	Kalamazoo *Gull Lake*	Kellogg Biological Station 34 yards E of VanderPloy Hall N42°24.389′-W85°24.135′	Stu Bassett & Elwood B. Ehrle	2005
Populus alba *White Poplar*	280	188	75	68	Wayne *Plymouth*	45389 N Territorial Rd	Joe Kaplan	
Populus alba * ***White Poplar***	**342**	**256**	**68**	**70**	**Charlevoix** ***S of Charlevoix***	**5358 Barnard Rd. 1.3 mi S of US-31. N45°17.055′-W85°17.399′**	**Elwood B. Ehrle**	**2005**
Populus alba *White Poplar*	332	225	85	87	Macomb *N of Utica*	50526 Van Dyke	R. Irwin & Paul Thompson	
Populus balsamifera *Balsam Poplar*		171			Menominee *Menominee Conservation District*	Big Tree Hunt Certificate		1997
Populus balsamifera * ***Balsam Poplar***	**258**	**171**	**75**	**46**	**Marquette** ***Champion***	**US – 41 N46°30.852′-W87°58.120′**	**Elwood B. Ehrle**	**2006**
Populus deltoides ***Eastern Cottonwood***	**473**	**343**	**107**	**92**	**Wayne** ***Wayne***	**Near Michigan and Josephine**	**Elwood B. Ehrle**	**1992**
Populus deltoides *Eastern Cottonwood*	460	300	137	90	Wayne *Detroit*	Middle Rouge Parkway. 34343 Dover Lane. 3 trunks @ 3 feet!	W. Lisbery	
Populus deltoides *Eastern Cottonwood*		308			Chippewa *Brimley*	Book St	David Milarch	2005

Populus grandidentata *Bigtooth Aspen*	222	118	88	63	Benzie *Lime Lake*	1/3 mi NW of Lake	John Spencer	1988
Populus grandidentata *Bigtooth Aspen*	238	110	110	70	Delta *Hiawatha National Forest*	6 mi N of US 2 E side of Sturgeon River	Don Henson	1980
Populus grandidentata * ***Bigtooth Aspen***	**254**	**105**	**132**	**67**	**Marquette** ***Huron Mountain Club***	**SW of Mummy Mountain** **E side of Fisher Creek Trail**	**Paul Thompson**	**1984**
Populus nigra var. italica ***Lombardy Poplar***	**314**	**194**	**110**	**40**	**Marquette** ***Marquette***	**On side of road.** **Lakeshore Blvd. and Pine St**	**Michael Neal**	**2001**
Populus nigra var. italica *Lombardy Poplar*	268	186	73	37	Chippewa *Sault Ste. Marie*	Bingham to Easterday Streets	H.J. Neff	1967
Populus nigra var. italicaa *Lombardy Poplar*	268	165	98	21	Marquette *Marquette*	Junction of US - 41 and Business US - 41	H.J. Neff	1965
Populus nigra var. italica *Lombardy Poplar*	282	196	81	20	Schoolcraft *Fayette Street Park*	2 mi S of Fayette St Park entrance Rear of residence. E side of M-183	John Spencer	1989
Populus tremuloides * ***Quaking Aspen***	**246**	**122**	**109**	**59**	**Ontonagon** ***Porcupine Mt. State Park***	**S Boundary Rd**	**Elwood B. Ehrle**	**1991**
Populus tremuloides *Quaking Aspen*	153	58	83	47	Leelanau *Good Harbor Bay*	E side of Shalda Rd. ½ mi from Lake Michigan	Paul Thompson	1960
Prunus americana ***American Plum***	**80**	**36**	**35**	**35**	**Oakland** ***S of Lakeville***		Paul Thompson	
Prunus americana *American Plum*	59	16	35	32	Oakland *Beverly Hills*	Beverly Rd	Paul Thompson	1964
Prunus armeniaca ***Apricot***	**188**	**118**	**54**	**63**	**Leelanau** ***Suttons Bay***	**227 Rt. 1** **SW corner Section 4**		**1984**
Prunus armeniaca *Apricot*	179	95	67	68	Antrim *Rapid City*	SW side of Torch Lake. W Torch Lk Dr.. Opposite Anita Rowland		1983

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Prunus armeniaca ***Apricot***	**193**	**123**	**54**	**63**	**Leelanau** ***Suttons Bay***	**Solem Rd., just E of Stave Rd.** **3 mi N of Suttons Bay**	**Allan Bakkar**	**1969**
Prunus armeniaca *Apricot*	161	123	30	30	Oakland *Oxford*	601 Coats S Rd	S & T Cumming	1989
Prunus avium *Sweet Cherry*	133	76	45	49	Wayne *Cass Benton Park*	Between 6 & 7 Mile Rd Just W of E Hines Drive	H.J. Neff	1967
Prunus avium *Sweet Cherry*		116			Ingham *Lansing*	622 Clemens Rd	Joe Kaplan & R. Brigham	1996
Prunus avium ***Sweet Cherry***	**156**	**104**	**38**	**56**	**Oakland** ***Rochester***	**291 Elmhill,** **just W of Orion Rd**	**Paul Thompson**	**1972**
Prunus avium var. plena ***Double Sweet Cherry***	**111**	**57**	**44**	**40**	**Ingham** ***Michigan State University***	**N of Williams Hall,** **S of Grand River Ave.** **N42°44′3.73″-W84°29′22.86″**	**Robert Bloye**	**2003**
Prunus cerasus *Common Sour Cherry*	170	108	51	45	Livingston *W of Plainfield*	Dutton Rd, S of M-36	H.J. Neff	1971
Prunus cerasus *Common Sour Cherry*	169	109	46	54	Branch *NW of Allen*	N Squires Rd; S Jonesville Rd Branch-Hillsdale line	H.J. Neff	1966
Prunus cerasus * ***Common Sour Cherry***	**206**	**119**	**68**	**75**	**Calhoun** ***3 mi N of Homer***	**7821 – 22 Mile Rd**	**Paul Thompson**	**1963**
Prunus pensylvanica ***Pin Cherry***	**148**	**47**	**95**	**22**	**Kalamazoo** ***Kalamazoo***	**Fischer Woods** **Douglas Rd opposite Hi-Lo Bar**	**Elwood B. Ehrle**	**1996**
Prunus pensylvanica *Pin Cherry*	128	29	88	44	Leelanau *NE of Maple City*	Wheeler Rd W of School Lake	Paul Thompson	1965

Prunus pensylvanica ***Pin Cherry***	**148**	**60**	**75**	**50**	**Kalamazoo** ***Kalamazoo***	**Fischer Woods – Different tree! Douglas Rd Opposite Hi-Lo Bar N42°19.891′-W85°36.082′**	**Emma Pitcher Elwood B. Ehrle**	**2003**
Prunus serotina *Wild Black Cherry*		201			Kalamazoo *Scotts*	10677 S 37th St ½ of crown lost	Elwood B. Ehrle	2004
Prunus serotina *Wild Black Cherry*	274	180	75	75	Kalamazoo *Oshtemo*	2398 Windemere. Bill Stiefel Behind house	Elwood B. Ehrle	1996
Prunus serotina *Wild Black Cherry*		204			Jackson *Jackson*	SE corner of Mapledale & Horton Rds. Jackson Co. Big Tree	Sharon Parker	1992
Prunus serotina * ***Wild Black Cherry***	**422**	**285**	**114**	**93**	**Van Buren** ***½ mi W of Lawrence***	**E side of S Kane Rd, on hillside 1970 National Champion**	**Paul Thompson**	**1959**
Prunus serotina *Wild Black Cherry*	307	192	93	88	Ottawa *Holland*	Headquarters Building at State Park	Paul Thompson	1983
Prunus serotina *Wild Black Cherry*	274	183	82	36	Washtenaw *S of Ypsilanti*	N end of Pineview Rd N of Textile Rd	Paul Thompson Joe Kaplan	1997
Prunus serrulata 'shirotae' ***Oriental Snow White Cherry***	**69**	**40**	**21**	**32**	**Ingham** ***Michigan State University***	**S of Gilchrist Hall, NE of Intermural Circle. N42°44′0.07″-W84°29′9.55″**	**Robert Bloye**	**2003**
Prunus virginiana *Choke Cherry*	136	53	68	61	Ingham *Lansing*	2397 Washington. N edge of golf course S of Lansing4	Berry	198
Prunus virginiana ***Choke Cherry***	**176**	**86**	**73**	**67**	**Wayne** ***Detroit***	**Back of house, NE corner of Curtis and McIntire**	**Diamond**	**1966**
Prunus virginiana *Choke Cherry*	160	77	67	63	Kent *Ada*	Thornapple River Drive Community Park	Paul Thompson	1989
Pseudotsuga menziesii var. menziesii ***Douglas-Fir***	**197**	**94**	**93**	**40**	**Calhoun** ***Battle Creek***	**Leila Arboretum N42°20.209′-W85°12.763′**	**Jeff Boddy & ElwoodB. Ehrle**	**2005**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Pseudotsuga menziesii var. menziesii *Douglas-Fir*	186	86	90	40	Washtenaw *Ann Arbor*	North Campus— Univ. of Michgan N42°17.954′- W83°42.851′	G. McPherson R. Pomorski Elwood B. Ehrle	2003
Pseudotsuga menziesii var. glauca *Rocky Mountain Douglas-Fir*	**152**	**56**	**90**	**25**	**Ingham *Michigan State University***	**E side of Williams Hall N42°44′4.17″-W84°29′17.74″**	**Robert Bloye**	**2003**
Ptelea trifoliata *Common Hoptree*	69	30	31	32	Kent *Ada*	Thornapple Community Park	Paul Thompson	1989
Ptelea trifoliata * *Common Hoptree*	**78**	**33**	**35**	**40**	**Kent *Ada***	**Thornapple Community Park**	**C. Rogers & Paul Thompson**	**1989**
Pyrus calleryana ′Autumn Blaze′ *Callery Pear ′Autumn Blaze′*	**89**	**47**	**34**	**33**	**Ingham *Michigan State University***	**Between Museum and Agriculture Hall N42°43′53.32″-W84°28′50.17″**	**Robert Bloye**	**2003**
Pyrus communis *Common Pear*	**200**	**136**	**51**	**50**	**Oakland *Clawson***	**1034 Cooks Rd**	**Paul Thompson**	**1966**
Quercus acutissima *Sawtooth Oak*	**161**	**80**	**67**	**55**	**Calhoun *Battle Creek***	**Leila Arboretum. N42°20.275′ – W85°12.261′**	**Jeff Boddy & Elwood B. Ehrle**	**2006**
Quercus alba *White Oak*	380	216	134	118	Washtenaw *W of Saline*	8275 Dell	Dale Minach	
Quercus alba *White Oak*	**389**	**258**	**100**	**124**	**Allegan *NW of South Haven***	**64th St – Elmhurst Farm N42°27.871′-W86°10.114′**	**Elwood B. Ehrle**	**2003**
Quercus alba *White Oak*	375	260	84	125	Allegan *Allegan*	1308 Ely St. Reported down in 2006	Elwood B. Ehrle	1993
Quercus alba *White Oak*	373	202	136	140	Branch *Coldwater*	264 Grand. Fairfield near Parsons	Paul Thompson H.J. Neff	1968

Quercus alba *White Oak*	371	268	83	81	Ionia *Lowell*	Along I-96 near Hastings Rd	Robert Roth & R. Pomorski	2002
Quercus alba × Quercus muehlenbergii *Deam Oak*	**177**	**106**	**57**	**55**	**Washtenaw** ***Ann Arbor-Hudan Mill Park***	**730 Country Club Rd. Between # 13 & # 18 on the fairway.**	**R. Pomorski & G. McPherson**	**2005**
Quercus bicolor *Swamp White Oak*	308	214	70	96	Montcalm *Fenwick*	1075 Bricker Rd N43°7.075′-W85°2.367′	Bob Franke & Elwood B. Ehrle	2003
Quercus bicolor *Swamp White Oak*	**397**	**246**	**119**	**127**	**Wayne** ***Canton Township***	**Rouge Bridge, SW of Palsar & Sheldon**	**Paul Thompson**	**1988**
Quercus bicolor *Swamp White Oak*	347	207	107	132	Ionia *5 mi NE of Utville*	W of Needham and Loucks	Paul Thompson	1988
Quercus bicolor *Swamp White Oak*	329	211	92	102	Bay *Bay City*	114 Boehringer Court	Paul Thompson	1984
Quercus bicolor *Swamp White Oak*	372	213	128	124	Clinton *NE of W Paolia*	W of Hinman Rd 0.6 mi N of Price Rd	Joseph Arens & Paul Thompson	
Quercus bicolor × Quercus alba (= Q. jackiana) *Jack Oak*	**317**	**165**	**118**	**137**	**Livingston** ***Howell***	**503 Grand River**	**Paul Thompson**	**1975**
Quercus bicolor × Quercus alba *Jack Oak*		133	97		Oakland *Troy*	28309 Maple , ½ mi E of John River	Paul Thompson	1987
Quercus cerris *Turkey Oak*	**177**	**103**	**61**	**50**	**Ingham** ***Michigan State University***	**Between Landon & Yakeley Hall N43°11′1.11″-W84°28′2.78″**	**Robert Bloye**	**2003**
Quercus coccinea *Scarlet Oak*	**392**	**243**	**117**	**126**	**Hillsdale** ***E of Jonesville***	**N Adams Rd Hybrid!**	**M. Hawkins & Paul Thompson**	
Quercus coccinea *Scarlet Oak*	267	154	91	89	Ottawa *Holland*	Opposite 413 168th Ave., N Lakeshore Drive	Paul Thompson	1966

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Quercus coccinea *Scarlet Oak*	262	146	93	93	Kalamazoo *Kalamazoo*	S of 6231 S 6th Ave.	Paul Thompson	1967
Quercus coccinea *Scarlet Oak*		196			Jackson *Jackson*	Fishville Rd, ½ mi N of Sharon Valley Rd. Jackson Co Big Tree	Sharon Parker	1998
Quercus ellipsoidalis ***Northern Pin Oak***	**271**	**139**	**103**	**115**	**Oakland** ***S of Lake Orion***	**Bald Mountain Rd, S of Greenleaf**	**Paul Thompson**	
Quercus imbricaria ***Shingle Oak***	**285**	**140**	**116**	**117**	**Calhoun** ***SW of Albion***	**22 Mile Rd & D Drive S**	**Paul Thompson**	
Quercus imbricaria *Shingle Oak*	277	108	139	121	Calhoun	23 1/2 Mile Rd, ¼ mi S of H drive, E side	Paul Thompson	1991
Quercus imbricaria *Shingle Oak*	264	134	102	112	Calhoun	7821 22½ Mile Rd		
Quercus macrocarpa *Bur Oak*	380	206	136	152	Lenawee	5245 Wolf Creek	Burt Wickling	1980
Quercus macrocarpa *Bur Oak*	368	226	110	126	Berrien *Three Oaks Township*	18431 S Three Oaks Rd. Open corner of yard, SE of house	Dennis Woodland	1997
Quercus macrocarpa ***Bur Oak***	**407**	**288**	**92**	**106**	**Berrien** ***Niles***	**702 Chippewa Trail**	**Elwood B. Ehrle**	**1994**
Quercus macrocarpa ***Bur Oak***	**405**	**250**	**128**	**108**	**St. Clair** ***Algonac***	**350 N Parkway**	**J Laurie & Paul Thompson**	
Quercus macrocarpa *Bur Oak*	298	205	73	80	Lapeer *Almont*	6816 General Squire Rd	Lynn Marta & Elwood B. Ehrle	2001
Quercus macrocarpa *Bur Oak*	392	230	126	142	Hillsdale *1.5 mi E of Prattsville*	Lime Lake Rd. and Elm Rd.—East side	Paul Thompson	1990

Quercus macrocarpa *Bur Oak*	361	216	114	123	Washtenaw W of Ann Arbor	Pleasant Lake Rd, ½ mi from E Parker	Paul Thompson	1990
Quercus macrocarpa *Bur Oak*	264	169	81	55	Oakland *Cranbrook Institute of Science*	Center of Kingswood Campus courtyard. N42°34′16.365″-W83°14′50.476″	Robert Bloye	2003
Quercus macrocarpa *Bur Oak*	288	175	95	70	Oakland *Pontiac*	599 Orchard Lake Goldner-Walsh Nursery	Elwood B. Ehrle	2005
Quercus macrocarpa × Quercus alba *Bebbs Oak*	325	200	100	100	Eaton *Charlotte*	Along I-69. Take Charlotte exit 60 going east. In middle of field along highway	Duane McKenna	1996
Quercus macrocarpa × Quercus alba ***Bebbs Oak***	**347**	**232**	**85**	**121**	**Oakland** **Rochester Hills**	**Livernois and Auburn Rds** **N42°38.110′-W83°09.134′**	**Elwood B. Ehrle**	**2005**
Quercus macrocarpa × Quercus alba *Bebbs Oak*	270	155	88	108	Kalamazoo *Battle Creek*	West edge of Fort Custer	Paul Thompson	1970
Quercus muehlenbergii ***Chinkapin Oak***	**355**	**215**	**110**	**120**	**Washtenaw** ***Ann Arbor***	**Wurster Park** **N42°16.314′-W83°45.261′**	**Elwood B. Ehrle**	**2003**
Quercus muehlenbergii *Chinkapin Oak*	309	192	92	98	Shiawassee *Corunna*	M-7, NW Corunna St, N Park	H.J. Neff	1966
Quercus muehlenbergii *Chinkapin Oak*	345	182	130	131	Oakland *Near Pontiac*	414 S Blvd (N Reiss)	Paul Thompson	1958
Quercus palustris *Pin Oak*	238	183	42	50	Kalamazoo *Portage*	2729 Woodhams Ave. J.D.Kosacek (269) 327-1942 N42°09.708′-W85°33.393′	Elwood B. Ehrle	2004
Quercus palustris ***Pin Oak***	**290**	**159**	**106**	**101**	**Wayne** ***Dearborn***	**24824 Fairmont**	**H.J. Neff**	**1970**

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Quercus palustris ***Pin Oak***	**285**	**157**	**103**	**101**	**Wayne** ***Flatrock***	**22310 Telegraph**	**Paul Thompson** **Joe Kaplan**	**1963** **1997**
Quercus prinoides ***Dwarf Chestnut Oak***	**75**	**23**	**46**	**23**	**Berrien** ***Warren Dunes State Park***	**W at Lake Price and stream**	**Paul Thompson**	**1960**
Quercus prinus *Chestnut Oak*	117	54	55	30	Wayne *Dearborn*	Southfield Rd & Michigan Ave Arboretum next to Ford Hqts.	Kelly & Daryl Self	2002
Quercus prinus ***Chestnut Oak***	**209**	**97**	**91**	**83**	**Ingham** ***Michigan State University***	**SW corner of Grand River Ave. & Crowley (517 Crowley St)**	**Robert Bloye**	**2003**
Quercus prinus *Chestnut Oak*		97			Jackson	Springbrook Rd, S of Mud Lake nr Bader Rd. Jackson Co. Big Tree	Sharon Parker	1991
Quercus robur ***English Oak***	**250**	**160**	**75**	**58**	**Benzie** ***Benzonia***	**Case S of Homestead. Tree is 137 yrs. Old. Was 155-81-76 (255pts.) In 1976. N44°36.966′-W86°5.347′**	**Elwood B. Ehrle**	**2004**
Quercus robur *English Oak*	231	120	89	87	Wayne *Northville*	Hines Drive	Paul Thompson	1985
Quercus robur *English Oak*	212	127	68	68	Grand Traverse *Traverse City*	State Hospital Grounds	B. Zimmerman	2005
Quercus robur *English Oak*	182	104	63	59	Ingham *Michigan State University*	SW side of Union N42°44′2.43″-W84°29′0.58″	Robert Bloye	2003
Quercus rubra *Northern Red Oak*	309	192	87	120	Kalamazoo *Scotts*	Mill Pond Park N42°11.749′-W85°25.358′	Elwood B. Ehrle	2004
Quercus rubra ***Northern Red Oak***	**398**	**276**	**100**	**87**	**Allegan** ***Saugatuck***	**329 St. Joseph**	**Elwood B. Ehrle**	**1993**

Quercus rubra *Northern Red Oak*	385	252	110	90	Calhoun *Convis Township*	22900 12 Mile Rd N42°24.200′-W85°03.850′	Jack Pooler & Elwood B. Ehrle	2003
Quercus rubra *Northern Red Oak*	371	232	112	109	Van Buren *NW Lawrence*	42nd Ave at CR 215 (54th St) Cemetery	Elizabeth Ketche	1973
Quercus rubra *Northern Red Oak*	363	244	96	91	Allegan *3 mi NW of Martin*	1466 120th Drive	Paul Thompson	1988
Quercus rubra *Northern Red Oak*	370	229	111	121	Wayne *Dearborn Heights*	441 S Gulley	Paul Thompson	1974
Quercus rubra × Quercus velutina *Hawkins Oak*		**46**			**Jackson** ***Waterloo Recreation Area***	**Nature Trail at Headquarters**	**H.J. Neff**	**1966**
Quercus schuettei ***Schuette Oak***	**370**	**246**	**100**	**94**	**Oakland** ***N Rochester***	**Letts & Rush** **N42°46.561′-W83°07.088′**	**Elwood B. Ehrle**	**2005**
Quercus shumardii ***Southern Red Oak***	**304**	**158**	**128**	**70**	**Wayne** ***Belle Isle***	**In woods off Central Ave** **Original ID by Herb Wagner**	**Susan Campbell** **Elwood B. Ehrle**	**2001**
Quercus stellata *Post Oak*	163	69	86	30	Ingham *Michigan State University*	SE corner Grand River & Beal Garden entrance. N42°43′55.97″-W84°28′29.40″	Robert Bloye	2003
Quercus stellata ***Post Oak***	**244**	**115**	**111**	**71**	**Ingham** ***Michigan State University***	**SE corner Collingswood &** **Grand River Ave.** **N42°43′55.97″-W84°28′29.40″**	**Robert Bloye**	**2003**
Quercus velutina *Black Oak*	383	236	115	127	Calhoun *4 mi W of Homer*	20 Mile Rd, ¼ mi N of M-60	Paul Thompson	1987
Quercus velutina *Black Oak*	347	222	101	94	Genesee *2 mi SW of Grand Blanc*	1 mi SE of Cook and Meadowland Drive	Paul Thompson	1982
Quercus velutina *Black Oak*	345	215	102	112	Macomb *Mt. Clemens*	Oxford and Riverside	Paul Thompson	

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Quercus velutina *Black Oak*	326	216	86	96	Cass	Colby and Alma N41.99026°×W86.09291°	Andrew and Noah Sawyer	2006
Quercus velutina ***Black Oak***	**396**	**256**	**120**	**80**	**St. Clair** ***Algonac***	**Washington and Clay School** **N42°37.240′-W82°31.923′**	**Elwood B. Ehrle**	**2003**
Quercus ×runcinata *Bottom Oak*	132	45	75	46	Washtenaw	Tubbs Rd, just N of Huron River	Paul Thompson	1968
Quercus ×runcinata ***Bottom Oak***	**275**	**152**	**96**	**106**	**Branch** ***Coldwater***	**338 E Chicago**	**Paul Thompson**	**1975**
Rhamnus cathartica *European Buckthorn*	90	38	40	47	Washtenaw *Ann Arbor*	Rear of Children's Hospital, beside the Huron Tower Apartments	D. Jones	1972
Rhamnus cathartica *European Buckthorn*	109	68	34	26	Kalamazoo *5 mi N of Kalamazoo*	Kalamazoo Nature Center, along River Trail	Joe Kaplan & D. Evers	1988
Rhamnus cathartica *European Buckthorn*	74	41	23	38	Ingham *Michigan State University*	SE of Student Union & across street	Robert Bloye	2003
Rhamnus cathartica * ***European Buckthorn***	**122**	**45**	**61**	**65**	**Washtenaw** ***Ann Arbor***	**N of Huron River, opposite** **Nichol Arboretum**	**D. Jones &** **Paul Thompson**	**1972**
Rhamnus frangula ***Glossy Buckthorn***	**65**	**23**	**35**	**22**	**Oakland** ***Pheasant Ridge***	**20 Kemberton** **Hedgerow along street**	**Paul Thompson**	**1967**
Rhamnus frangula *Glossy Buckthorn*	56	15	34	27	Washtenaw *Ann Arbor*	Arboretum near RR track E of RR bridge	Paul Thompson	1968
Rhamnus frangula * ***Glossy Buckthorn***	**66**	**20**	**40**	**25**	**Oakland** **Bloomfield Hills**	**Cranbrook Institute of Science**	**Paul Thompson**	**1975**
Rhus copallina *Shining Sumac*	51	18	26	28	Wayne *Northville*	¼ mi S of 6 Mile Rd	H.J. Neff	

Rhus copallina *Shining Sumac*	52	12	33	28	Berrien *New Buffalo*	13201 Watson Rd	Paul Thompson	1967
Rhus copallina * ***Shining Sumac***	**58**	**20**	**33**	**20**	**Kalamazoo** ***Vicksburg***	**Prudential Nursery**	**Paul Thompson**	**1975**
Rhus glabra ***Smooth Sumac***	**37**	**13**	**18**	**23**	**Hillsdale** ***1 mi S of Somerset Center***	**Waldrin Rd, edge of fen**	**Paul Thompson**	**1986**
Rhus typhina ***Staghorn Sumac***	**73**	**40**	**26**	**26**	**Oakland** ***Clawson***	**433 N Custer**	**H. DeVries**	**1960**
Rhus typhina ***Staghorn Sumac***	**72**	**41**	**25**	**25**	**Cass** ***Cassopolis***	**405 Smith St**	**W. Brown & D. Hadley**	
Robinia pseudoacacia *Black Locust*	294	193	81	78	Jackson *Springport*	15202 Springport (M-99) 599 Main St	Harold Howe	1965
Robinia pseudoacacia *Black Locust*	294	162	105	108	Wayne *Detroit*	Elmwood Cemetery— near entrance	Paul Thompson	1976
Robinia pseudoacacia ***Black Locust***	**351**	**234**	**96**	**85**	**Hillsdale** ***7 mi NE Pittsford***	**1334 Stewart**	**Wm. Hoppe & Paul Thompson**	**1972**
Robinia ×ambigua ***Pink Idaho Locust***	**53**	**24**	**24**	**20**	**St. Clair** ***Crassco Township***	**9861 Meisner Lane SW of Adair, MI Front of Club House Entrance**	**Ray E. Lapinski**	**2003**
Salix alba *White Willow*	429	298	104	108	Lenawee *1 mi. NE of Macon*	Macon Rd at stream	Paul Thompson	1975
Salix alba *White Willow*	392	293	77	88	Huron *Harbor Beach*	231 Water St	Paul Thompson	1984
Salix alba *White Willow*	446	293	121	126	Wayne *Livonia*	31460 Pyron Rd (Belle Cr.)	Paul Thompson	1977

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Salix alba var. tristis ***Golden Willow***	**368**	**286**	**68**	**55**	**Oakland** ***W of New Hudson***	**60690 Pontiac Trail**	**Andrew and Noah Sawyer** **Joe Kaplan**	**2006** **1997**
Salix amygdaloides *Peachleaf Willow*	130	48	68	54	Benzie	Dead Stream at road	Paul Thompson	1976
Salix amygdaloides *Peachleaf Willow*	125	45	69	44	Leelanau *Empire*	N Bar Lake	Paul Thompson	1975
Salix amygdaloides ***Peachleaf Willow***	**184**	**61**	**112**	**42**	**Macomb** ***S of Utica***	**Dodge Park # 8**	**Paul Thompson**	**1975**
Salix babylonica *Weeping Willow*	329	222	85	87	Kent *Ada*	7570 5 Mile Rd	Tom Kersjec	
Salix babylonica * ***Weeping Willow***	**453**	**344**	**86**	**93**	**Livingston** ***Hartland***	**4450 Bullard Rd**	**J. Pergament & Paul Thompson**	
Salix bebbiana ***Bebbs Willow***	**72**	**36**	**31**	**18**	**Leelanau** ***N of Maple City***	**S Lime Lake Rd**	**Paul Thompson**	**1960**
Salix bebbiana *Bebbs Willow*	64	18	36	38	Leelanau *Cedar*	Railroad	Paul Thompson	1976
Salix discolor *Pussy Willow*		40			Washtenaw *Saline*	211 N Ann Arbor St Big Tree Hunt	C. Bairee	1997
Salix discolor ***Pussy Willow***	**95**	**56**	**32**	**28**	**Shiawassee** ***2.5 mi S of Laingsburg***	**9860 Woodbury Rd.** **66″ girth at 2 feet**	**P. Swartz** **Joe Kaplan**	**1996**
Salix discolor *Pussy Willow*	73	25	43	21	Leelanau	RR W of Solon swamp	Paul Thompson	1970
Salix discolor *Pussy Willow*	66	20	36	38	Leelanau *Good Harbor*	Good Harbor Rd, N of Mill	Paul Thompson	1978

Salix exigua ***Sandbar Willow***	**84**	**26**	**52**	**23**	**Wayne** ***Detroit***	**Tulip Arm— Lower Huron Metro Park**	**Paul Thompson**	**1989**
Salix exigua *Sandbar Willow*	76	28	42	23	Macomb *Near Utica*	Footbridge, Utica Recreation Area	Paul Thompson	1967
Salix fragilis *Crack Willow*	400	255	110	138	Oakland *NE of Rochester*	Sheldon, 0.4 mi N of Mead Rd	Paul Thompson	1964
Salix fragilis *Crack Willow*	444	338	82	94	Oakland *Beverly Hills*	Douglas, 31805 Evergreen Rd	Paul Thompson Joe Kaplan	1985 1997
Salix fragilis * ***Crack Willow***	**458**	**305**	**122**	**124**	**Macomb** ***NW of Utica***	**Utica Recreation Area, S side of bridge, E side of river.**	**H.J. Neff Paul Thompson**	**1964**
Salix fragilis * ***Crack Willow***	**459**	**310**	**116**	**131**	**Oakland** ***Beverly Hills***		**Paul Thompson**	
Salix nigra ***Black Willow***	**448**	**323**	**96**	**116**	**Washtenaw** ***Ann Arbor***	**227 Benton Shore Drive**	**Paul Thompson**	**1982**
Salix nigra *Black Willow*	414	274	115	98	Wayne *Canton*	N end of Hertay. NE of Don Allen residence	Paul Thompson	1988
Salix petiolaris * ***Meadow Willow***	**52**	**13**	**34**	**18**	**Leelanau**	**E shore of Traverse Lake**	**Paul Thompson**	**1975**
Salix pyrifolia ***Balsam Willow***	**28**	**11**	**15**	**8**	**Chippewa** ***Sugar Island***		**J. Hiltruman**	
Salix serissima * ***Autumn Willow***	**94**	**35**	**48**	**44**	**Oakland** ***Birmingham***	**Northlawn & Cranbrook Rds**	**Paul Thompson**	
Sambucus canadensis ***Common Elderberry***	**45**	**14**	**26**	**18**	**Leelanau** ***Cedar City***	**Swamp along RR**	**Paul Thompson**	**1976**
Sambucus canadensis *Common Elderberry*	35	12	19	14	Oakland *Beverly Hills*	17503 Kirkshire	Paul Thompson	1974

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Sambucus pubens *Red Elderberry*	36	18	15	13	Mackinac *Mackinac Island*	Woods, W bluff	Paul Thompson	1966
Sambucus pubens ***Red Elderberry***	**51**	**20**	**27**	**15**	**Keweenaw** ***Lac La Belle***	**2 mi NE**	**J. Wells & Paul Thompson**	**1972**
Sassafras albidum *Sassafras*	269	168	82	76	Allegan *Allegan*	120th Ave., 0.7 mi E of 20th St	C. Draper	1971
Sassafras albidum *Sassafras*	250	175	60	58	Cass *Dowagiac*	Indian Lake	D. Chaddock D. Woodland	2002
Sassafras albidum ***Sassafras***	**276**	**182**	**78**	**64**	**Jackson** ***Jackson***	**1318 Coddington Lane**	**J. Allison & Paul Thompson**	**1984**
Sassafras albidum *Sassafras*	259	156	82	82	Berrien *Lakeside*	Park Lane	W. Royce & C. Cook	
Sequoiadendron giganteum ***Giant Sequoia***	**270**	**168**	**93**	**35**	**Manistee** ***Manistee***	**Lake Bluff Audubon, 2890 Lakeshore Drive. Was 151-89-30 in 1995. N44°17.425′-W86°18.630′**	**Elwood B. Ehrle**	**2004**
Sophora japonica ***Japanese Pagoda Tree***	**266**	**136**	**102**	**110**	**Monroe** ***Monroe***	**St. Marys. Elm St and US-25**	**H.J. Neff Paul Thompson**	**1970**
Sophora japonica *Japanese Pagoda Tree*	150	91	46	52	Oakland	14 Mile Rd E of Rochester Rd	Paul Thompson	
Sophora japonica *Japanese Pagoda Tree*	147	52	78	66	Ingham *Michigan State University*	Near custodial entrance of Music Bldg. N42°43′56.97″-W84°29′4.45″	Robert Bloye	2003
Sorbus americana ***American Mountain Ash***	**128**	**62**	**57**	**35**	**Houghton** ***Lorus Point***	**Little Traverse Bay on Keweenaw Bay T55N,R31W, Sect. 28, NW ½ SW ¼**	**L. Berndt**	**1984**

Sorbus americana ***American Mountain Ash***	**131**	**44**	**71**	**62**	**Leelanau**	**Gill Pier Rd. at Lake Michigan**	**Paul Thompson**	**1976**
Sorbus aucuparia ***European Mountain Ash***	**94**	**56**	**32**	**25**	**Grand Traverse**	**8641 US-31 N Owner Fran Zanes. Planted 1947**	**Joe Kaplan D. McCormick C. Counard**	**1996**
Sorbus aucuparia *European Mountain Ash*	79	32	38	34	Lenawee *Hidden Lake*	Gardens near Tipton	Paul Thompson	
Sorbus decora *Showy Mountain Ash*	117	51	60	24	Mackinac *1½ mi s of Gilchrist*	T43N, R9W, Sect.14, NE ¼, SW ¼	William Mahalak	1967
Sorbus decora * ***Showy Mountain Ash***	**123**	**57**	**58**	**32**	**Mackinac *7 mi S of Gould City***	**Sect. 33, SW ¼, NE ¼**	**William Mahalak**	**1972**
Staphylea trifoliata *American Bladdernut*		53			Wayne *Northville*	Big Tree Contest	Gail McPherson	2002
Staphylea trifoliata ***American Bladdernut***	**49**	**15**	**29**	**21**	**Macomb *Rochester***	**Utica Recreation Area, extreme S End, creek bank E of Clinton River**	**H.J. Neff**	**1966**
Staphylea trifoliata ***American Bladdernut***	**45**	**13**	**28**	**16**	**Macomb *Mt. Clemens***	**Woods near Oxford Road and Riverside Drive**	**H.J. Neff**	**1964**
Staphylea trifoliata *American Bladdernut*	42	15	23	16	Wayne *Lower Huron Metro Park*	Extreme SW corner of golf course, near the river	D. McCormick Joe Kaplan	1997
Syringa reticulata ***Japanese Lilac***	**60**	**31**	**24**	**19**	**Kalamazoo *Kellogg Biological Station***	**Gull Lake, E of Manor House, N42°24.347′-W85°24.086′**	**Stu Bassett & Robert Bloye**	**2004**
Syringa vulgaris ***Lilac***	**102**	**65**	**30**	**29**	**Mackinac *St. Ignace***	**232 Point La Garbe Rd With another in front lawn**	**Elwood B. Ehrle Charles Ulrich**	**1998**
Syringa vulgaris *Lilac*	82	49	25	31	Mackinac *Mackinac Island*	Market St W of Fort St Front of Metivier Inn	Elwood B. Ehrle Charles Ulrich	1998

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Syringa vulgaris *Lilac*	92	59	25	31	Mackinac *Mackinac Island*	Across from St. Anne's Church Near Sidewalk	Elwood B. Ehrle Charles Ulrich	1998
Syringa vulgaris *Lilac*	85	50	25	40	Mackinac *Mackinac Island*	French Lane near Market St. Back corner of side yard	Elwood B. Ehrle Charles Ulrich	1998
Syringa vulgaris *Lilac*	70	35	27	30	Mackinac *Mackinac Island*	Grand Ave., 2 doors N of Grand Cottage	Elwood B. Ehrle Charles Ulrich	1998
Syringa vulgaris *Lilac*	89	52	28	37	Mackinac *Mackinac Island*	Grand Ave., at Grand Cottage	Elwood B. Ehrle Charles Ulrich	1998
Syringa vulgaris *Lilac*	80	40	30	39	Mackinac *Mackinac Island*	Huron St. near Church St Harbor View Inn	Elwood B. Ehrle Charles Ulrich	1998
Taxodium distichum var. distichum – *Bald Cypress*	**192**	**75**	**110**	**27**	**Berrien** ***St. Joseph***	**2215 Wilson Court** **1 block E of new Courthouse**		
Taxodium distichum var. distichum – *Bald Cypress*	**193**	**116**	**68**	**34**	**Kalamazoo** ***Kalamazoo***	**Kleinstuck Preserve** **Along trail on N side**	**D. Dehn &** **Elwood B. Ehrle**	**1996**
Taxodium distichum var distichum – Bald Cypress	163	75	80	33	Van Buren *South Haven*	S of intersection of M-140 & M-31 On M-140, 1.4 mi S of light	Rague	1966
Taxus media 'Halloran' ***Halloran Yew***	**38**	**17**	**15**	**25**	**Ingham** ***Michigan State University***	**W of Cowles House** **N42°43′58.26″-W84°29′5.71″**	**Robert Bloye**	**2003**
Tetradium danielli ***Korean Euodia***	**163**	**54**	**101**	**32**	**Ingham** ***Michigan State University***	**Beal Gardens, W bank,** **N of Red-Wood.** **N42°43′53.83″-W84°29′4.44″**	**Robert Bloye**	**2003**
Thuja occidentalis ***White Cedar or Arbor Vitae***	**244**	**155**	**80**	**37**	**Oakland** ***Oxford***	**N of gravel pits on M-24.** **0.5 mi E & 1 mi N of Ray Rd** **& M-24 intersection**	**Paul Thompson**	**1960**

Thuja occidentalis * *White Cedar or Arbor Vitae*	**240**	**153**	**81**	**22**	**Leelanau** *S Manitou Island*	**Valley of the Giants**	**Andrew and Noah Sawyer**	**2006**
Thuja orientalis *Oriental Arbor Vitae*	**72**	**24**	**39**	**36**	**Ingham** *Michigan State University*	**Beal Gardens— SW corner of Library. N42°43′55.12″-W84°28′58.37″**	**Robert Bloye**	**2003**
Tilia americana * *Basswood*	**349**	**275**	**57**	**68**	**Ingham** *SE of Dansville*	**S side of M-36. E of Kinsey Rd Former National Champion**	**Elwood B. Ehrle**	**1993**
Tilia americana *Basswood*	304	202	83	76	Leelanau *Sleeping Bear*	Treat Farmhouse Contact Neal Bullington	John Spencer & Elwood B. Ehrle	1995
Tilia americana *Basswood*	333	204	112	67	Grand Traverse *Old Mission Peninsula*	In yard of Old Mission School		
Tilia cordata *Small Leaved Linden*	**129**	**68**	**50**	**45**	**Calhoun** *Battle Creek*	**Leila Arboretum. N42°20.359′ –W85°12.634′**	**Jeff Boddy & Elwood B. Ehrle**	**2006**
Tilia platyphyllos *Large Leaved Basswood*		**132**			**Jackson**	**10790 County Farm Rd (private) Jackson County Big Tree**	**Sharon Parker**	**1992**
Tilia tomentosa *Silver Linden*	**136**	**54**	**72**	**39**	**Ingham** *Michigan State University*	**E of Paclucci Bldg. , N of Student Services. N42°43′57.65″- W84°28′34.74″**	**Robert Bloye**	**2003**
Tilia ×europea 'Pallida' *Kaiser Linden*. **Tilia cordata × Tilia platyphyllos**	**135**	**40**	**88**	**28**	**Ingham** *Michigan State University*	**NW corner of Olin N42°44′2.05″ – W84°28′47.93″**	**Robert Bloye**	**2003**
Toxicodendron vernix *Poison sumac*	**54**	**15**	**31**	**30**	**Oakland** *SE of Lakeville*	**Lakeville Swamp**	**Paul Thompson**	**1964**
Tsuga canadensis *Eastern Hemlock*	288	152	118	70	Ontonagon *Porcupine Mt. State Park*	Mirror Lake Trail, S of Lake of the Clouds	Paul Thompson	1968
Tsuga canadensis *Eastern Hemlock*	215	160	46	36	Benzie *Benzonia*	7913 Homestead Rd	R. Henry	

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Tsuga canadensis ***Eastern Hemlock***	**301**	**164**	**121**	**62**	**Emmet** ***S of Cross Village***	**316 Petoski St**	**S. Grahm**	**1981**
Tsuga caroliniana ***Carolina Hemlock***	**192**	**95**	**81**	**62**	**Oakland**	**Bloomfield Hills**	**Paul Thompson**	
Ulmus americana *American Elm*	358	221	109	113	Washtenaw *Near Dexter*	Brand Rd. S of Territorial	Ferri & Paul Thompson	1962
Ulmus americana *American Elm*	311	204	84	90	Oakland *White Lake Township*	M-59 & Teggerdyne Rd between Mobile Station & Carwash	O. Anderson & Elwood B. Ehrle	2001
Ulmus americana ***American Elm***	**400**	**226**	**146**	**112**	**Wayne** ***Detroit – Bonnie Brook***	**Shiawassee Drive**	**Patrick Costello**	**1990**
Ulmus americana *American Elm*	368	219	119	118	Wayne *Grosse Point Woods*	Sunningdale Drive, nearly opposite brick chruch, to Lochman Golf Club	Patty Mogk & Elwood B. Ehrle	2001
Ulmus americana *American Elm*	383	237	119	108	Wayne *Grosse Point Farms*	372 Provencal, off Lake Shore Rd	Patty Mogk & Elwood B. Ehrle	2001
Ulmus glabra ***Wych Elm***	**274**	**158**	**97**	**77**	**Wayne** ***Grosse Point Boulevard***	**At Dyer in a Lane**	**H.J. Neff**	**1965**
Ulmus glabra *Wych Elm*	215	116	85	57	Wayne *Detroit*	Chene St at E Warren	H.J. Neff	1965
Ulmus glabra *Wych Elm*		261	87		Ingham *Michigan State University*	Yakeley Hall & West Circle Drive	Joe Kaplan	1996
Ulmus minor ***Smooth-Laced Elm***	**245**	**145**	**83**	**66**	**Ingham** ***Michigan State University***	**E of Olin** **N42°43′59.24″-W84°28′43.91″**	**Robert Bloye**	**2003**
Ulmus minor var. vulgaris *English Elm (U. procera?)*	223	124	81	71	Ingham *Michigan State University*	E of Olin N42°43′59.08″ – W84°28′44.13″	Robert Bloye	2003

Ulmus minor var. vulgaris ***English Elm (U. procera?)***	**364**	**235**	**102**	**107**	**Ingham** ***Michigan State University***	**S of Gilchrist Hall N42°44′0.57″- W84°29′13.36″**	**Robert Bloye**	**2003**
Ulmus parvifolia *Chinese Elm*	149	76	56	68	Washtenaw *Ann Arbor*	1605 E Stadium	AA Big Tree Registry	1995
Ulmus parvifolia ***Chinese Elm***	**189**	**92**	**81**	**65**	**Ingham** ***Michigan State University***	**S side of Agriculture Hall N42°43′50.71″- W84°28′44.91″**	**Robert Bloye**	**2003**
Ulmus procera ***English Elm***	**267**	**179**	**76**	**48**	**Washtenaw** ***Ann Arbor***	**2100 Devonshire**	**AA Big Tree Registry**	**1995**
Ulmus pumila *Siberian Elm*	338	179	122	147	Oakland *Rochester*	Romeo and Parkdale Sts	H.J. Neff	1968
Ulmus pumila ***Siberian Elm***	**351**	**234**	**94**	**92**	**Ottawa** ***Zeeland***	**370 E Rich Rd, N side of Bus I-96 Just E of 96th Ave**	**Joe Kaplan**	**1996**
Ulmus pumila *Siberian Elm*	245	109	110	104	Wayne *Detroit*	Front yard at 18244 Monica Drive	Paul Thompson	1966
Ulmus pumila *Siberian Elm*		255			Livingston *Gregory*	Big Tree Contest	Richard Pomorski	2002
Ulmus rubra *Slippery Elm*	180	104	62	57	Ingham *Michigan State University*	Near Wells Hall and Red Cedar River	Joe Kaplan	1996
Ulmus rubra ***Slippery Elm***	**324**	**160**	**140**	**97**	**Oakland** ***Havenhill***	**NE end of swamp**	**Paul Thompson**	**1958**
Ulmus serotina *September Elm*	187	98	71	70	Wayne *Trenton*	Elizabeth Park. To W of channel near entrance	H.J. Neff	1965
Ulmus serotina ***September Elm***	**193**	**102**	**74**	**68**	**Wayne** ***Trenton***	**Elizabeth Park. To W of channel near entrance**	**H.J. Neff**	**1965**
Ulmus thomasii *Rock Elm*	293	196	70	107	Eaton *10 mi N of Lansing*	25 mi E of U.S. 127 0.5 mi N of Round Lake Rd	Mark Halvorson Elwood B. Ehrle	2001

(Continued)

TABLE 2. Continued

Latin Name *Common Name*	Pts	G	H	C.S.	County *Town or Area*	Location	Observer(s)	Year
Ulmus thomasii *Rock Elm*	207	117	75	61	Grand Traverse *S of Hammond*	Senfield Rd E M-611	H. Harvey	1967
Ulmus thomasii Rock Elm	176	71	84	84	Ingham *Michigan State University*		Paul Thompson	1976
Ulmus thomasii * ***Rock Elm***	**350**	**202**	**117**	**122**	**Cass** ***3 mi SE of Cassopolis***	**Brownville & Crooked Creek**	**Paul Thompson**	
Ulmus ×hollandica ***Klemmer Dutch Elm***	**159**	**76**	**71**	**46**	**Ingham** ***Michigan State University***	**NE corner of Berkeley Hall** **N42°43′59.77″- W84°28′41.51″**	**Robert Bloye**	**2003**
Ulmus ×vegeta ***Camperdown Elm***	**166**	**125**	**31**	**40**	**Kalamazoo** ***Portage***	**W side of Portage Rd** **¼ mi N of Romence Rd**	**Stu Bassett**	**2004**
Ulmus ×vegeta ***Camperdown Elm***	**168**	**127**	**30**	**45**	**Mackinac** ***Mackinac Island***	**E of town on hill. Two streets up from Butterfly House**	**Stu Bassett**	**2004**
Ulmus ×vegeta ***Camperdown Elm***	**173**	**133**	**30**	**39**	**Kalamazoo** ***Kalamazoo***	**W. of 2615 Parkview Ave**	**Stu Bassett** **Elwood B. Ehrle**	**2006**
Viburnum alnifolium ***Viburnum***	**32**	**10**	**18**	**15**	**Wayne** ***Trenton***	**Elizabeth Park** **E of lagoon**	**Paul Thompson** **Joe Kaplan**	**1975** **1997**
Viburnum lentago *Nannyberry*	57	17	32	33	Wayne *Trenton*	Elizabeth Park N Middle Bridge	Paul Thompson	1975
Viburnum lentago * ***Nannyberry***	**94**	**34**	**50**	**40**	**Oakland** ***Bloomfield Hills***	**N of Cranbrook** **Institute of Sciences**	**Paul Thompson**	
Viiburnum plicatum var. tomentosum cv St. Kelver ***St. Kelver's Double-file Viburnum***	**27**	**10**	**12**	**20**	**Ingham** ***Michigan State University***	**Beal Garden, N of Fish Pond** **N42°43′52.13″ – W84°29′5.26″**	**Robert Bloye**	**2003**

Viburnum prunifolium ***Black Haw***	**57**	**14**	**36**	**28**	**Oakland** ***SE Lakeville***	**Cedar swamp**	**Paul Thompson**	**1984**
Viburnum prunifolium *Black Haw*	48	17	24	27	Oakland *SW Lakeville*	Cedar Swamp	Paul Thompson Joe Kaplan	1962 1997
Viburnum trilobum *Highbush-Cranberry*	32	10	19	13	Oakland *Beverly Hills*	17503 Kirkshire	Paul Thompson	1964
Viburnum trilobum *Highbush-Cranberry*	39	11	23	18	Oakland *Bloomfield Hills*	Cranbrook Institute of Science	Paul Thompson	1975
Viburnum trilobum * ***Highbush-Cranberry***	**49**	**18**	**25**	**25**	**Wayne** ***Trenton***	**Elizabeth Park , W of lagoon**	**Paul Thompson**	**1975**
Viburnum trilobum * ***Highbush-Cranberry***	**50**	**10**	**32**	**31**	**Oakland** ***Bloomfield Hills***	**Cranbrook Institute of Science**	**Paul Thompson**	
Viburnum ×carlcephalum ***Fragrant Viburnum***	**22**	**6**	**13**	**11**	**Ingham** ***Michigan State University***	**Beal Gardens, S of IM Circle** **N42°43′52.27″- W84°29′7.23″**	**Robert Bloye**	**2003**
Zanthoxylum americanum *Prickly-Ash*	35	15	16	14	Lenawee *S of Tecumseh*	In valley of Raisin Center Rd at Ives	R. Smith	
Zanthoxylum americanum * ***Prickly-Ash***	**53**	**15**	**28**	**38**	**Oakland** ***Beverly Hills***	**Rouge Park, W of Evergreen**	**Paul Thompson**	**1978**
Zelkova serrata ***Japanese Zelkova***	**239**	**144**	**82**	**52**	**Ingham** ***Michigan State University***	**E of Student Services Building** **N42°43′53.57″- W84°28′32.04″**	**Robert Bloye**	**2003**

TABLE 3. Alphabetical list of abbreviations used in Table 2 of the Big Trees and Shrubs of Michigan

#	Number
+	Plus
*	Current or former National Champion
AA	Ann Arbor
Admin	Administration
Ave	Avenue
Betw	Between
Bldg	Building
Blvd	Boulevard
Bus	Business
CC	Community College
Co	County
Cr	Creek
C.R.	County Road
CS or C.S.	Crown Spread
Ctr	Center
cv	Cultivar
Dev	Development
Dr	Drive
E	East
Eliz Park	Elizabeth Park
ENE	Eastnortheast
Entr	Entrance
Ft	Feet
Ft	Fort
G	Girth in inches
Gov't	Government
GPS	Global Positioning by Satellite
H	Height in feet
Hdqs or Hqtr	Headquarters
Hse	House
I-	Interstate Highway
Id	Identification
IM	Intermural
Inst	Institute
Kellogg Bio. Station	Kellogg Biological Station
M-	Michigan State Road
Mi	Mile
Mt	Mountain
N	North
NCh (or *)	Current or former National Champion
NE	Northeast
Nr	Near
NW	Northwest
Pk	Park
Pkg	Parking
Pt	Point
Pte	Pointe
Pts	Points
R	River
R	Range
Rd	Road
Rds	Roads
Res	Residence
RR	Railroad
S	South
SE	Southeast
Sect.	Section
S.R.	State Road
St.	Saint
St	State
St	Street
Stat	Station
Sts	Streets
Subdiv	Subdivision
SW	Southwest
T	Township
Twp	Township
Univ	University
US	US Highway
Var	Variety
W	West
×	hybrid

the same trees and shrubs by common names to facilitate finding a tree or shrub when only the common name is known. Table 5 presents a list of these same trees and shrubs arranged by county.

The scientific and common names used in these lists are those regularly used in books and manuals treating the plants known to be growing in the Great Lakes area. Important among these are Barnes and Wagner (1981 and 2004), Voss' three volumes on the flora of Michigan (Voss, 1972, 1985, & 1996), Gleason and Cronquist (1991), Dirr (1983), and Rehder (1951). In most cases there is little uncertainty about what name to use. A few, however, are problematic. Most of these are related to hybrids between species or a difference of taxonomic opin-

TABLE 4. Common Names of Michigan's Big Trees and Shrubs

Common Name	Genus/species
Alaska-Cedar	Chamaecyparis nootkaensis
Alder, Black	Alnus glutinosa
Alder, Speckled	Alnus rugosa
Apple, Common	Malus pumila or M. sylvestris
Apple, Crab	Malus coronaria
Apple, Southern Crab	Malus angustifolia
Apricot	Prunus armeniaca
Arborvitae, Oriental	Thuja orientalis
Ash, Black	Fraxinus nigra
Ash, Blue	Fraxinus quadrangulata
Ash, Green	Fraxinus pennsylvanica
Ash, Pumpkin	Fraxinus profunda
Ash, White	Fraxinus americana
Aspen, Bigtooth	Populus grandidentata
Aspen, Quaking	Populus tremuloides
Bald Cypress	Taxodium distichum var. distichum
Basswood	Tilia americana
Basswood, Large-leaved	Tilia platyphylla
Beech, American	Fagus grandifolia
Beech, American Weeping	Fagus grandifolia var. pendula
Beech, Copper	Fagus sylvatica var. atropunicea
Beech, European	Fagus sylvatica
Beech, European Cut-leaf	Fagus sylvatica var. laciniata
Beech, European Purple-leaf	Fagus sylvatica var. purpurea
Beech, European Spaeth	Fagus sylvatica var. spatheana
Beech, Tricolor	Fagus sylvatica var. tricolor
Beech, European Weeping	Fagus sylvatica var. pendula
Beech, Fern-Leaved	Fagus sylvatica var. heterophylla
Birch, European White	Betula pendula
Birch, Hybrid	Betula ×purpusii
Birch, Mt. Paper	Betula papyrifera var. cordifolia
Birch, Paper	Betula papyrifera
Birch, River	Betula nigra
Birch, Western Paper	Betula occidentalis
Birch, Yellow	Betula alleghaniensis
Black Haw	Viburnum prunifolium
Bladdernut, American	Staphylea trifoliata
Box-elder	Acer negundo
Buckeye, Ohio	Aesculus glabra
Buckeye, Red	Aesculus pavia
Buckeye, Yellow	Aesculus octandra
Buckthorn, European	Rhamnus cathartica
Buckthorn, Glossy	Rhamnus frangula
Burning-bush or Wahoo, Eastern	Euonymus atropurpurea
Butternut	Juglans cinerea
Buttonbush	Cephalanthus occidentalis
Catalpa, Northern	Catalpa speciosa
Catalpa, Southern	Catalpa bignoniodes
Cedar, Japanese	Cryptomeria japonica var. lobbii
Cedar of Lebanon	Cedrus lebani
Cedar, White or ArborVitae	Thuja occidentalis
Cherry, Choke	Prunus virginiana

(Continued)

TABLE 4. Continued

Common Name	Genus/species
Cherry, Common Sour	Prunus cerasus
Cherry, Double Sweet	Prunus avium "Plena"
Cherry, Oriental Snow White	Prunus serrulata "Shirotae"
Cherry, Pin	Prunus pensylvanica
Cherry, Sweet	Prunus avium
Cherry, Wild Black	Prunus serotina
Chestnut, American	Castanea dentata
Chestnut, Chinese	Castanea mollissima
Chokeberry	Aronia melanocarpa
Cockspur thorn	Crataegus crus-galli
Coffee-tree, Kentucky	Gymnocladus dioicus
Cork Tree, Amur	Phellodendron amurense
Cornelian Cherry	Cornus mas
Cottonwood, Eastern	Populus deltoides
Crab, Prairie	Malus ioensis
Crabapple, 'Barbara Ann'	Malus × 'Barbara Ann'
Crabapple, 'Bob White'	Malus 'Bob White'
Crabapple, Japanese Flowering	Malus floribunda
Crabapple, 'Mary Potter'	Malus 'Mary Potter'
Crabapple, Oregon	Malus fusca
Crabapple, Redbud	Malus sieboldii var. zuni cv calocarpa
Crabapple scheideckeri	Malus ×scheideckeri
Crabapple, Tea	Malus hupehensis
Cucumber-tree	Magnolia acuminata
Cypress, Bald	Taxodium distichum var. distichum
Devil's Walking Stick	Aralia spinosa
Dogwood, Alternate Leaved	Cornus alternifolia
Dogwood, Chinese	Cornus kousa var. chinensis
Dogwood, Flowering	Cornus florida
Dogwood, Flowering Red	Cornus florida f. rubra
Dogwood, Gray	Cornus foemina var. racemosa
Dogwood, Red-osier	Cornus stolonifera
Dogwood, Silky	Cornus purpusii
Douglas-Fir	Pseudotsuga menziesii var. menziesii
Douglas-Fir, Rocky Mountain	Pseudotsuga menziesii var. glauca
Elderberry, Common	Sambucus canadensis
Elderberry, Red	Sambucus pubens
Elm, American	Ulmus americana
Elm, Camperdown	Ulmus ×vegeta
Elm, Chinese	Ulmus parvifolia
Elm, English	Ulmus procera
Elm, Klemmer Dutch	Ulmus hollandica
Elm, Rock	Ulmus thomasii
Elm, September	Ulmus serotina
Elm, Siberian	Ulmus pumila
Elm, Slippery	Ulmus rubra
Elm, Smooth-laced	Ulmus minor
Elm, Wych	Ulmus glabra
Euodia, Korean	Tetradium danielli
Euonymus, Winged	Euonymus alata
False Cypress, Hinoki	Chamaecyparis obtusa
Fir, Balsam	Abies balsamea
Fir, Douglas	Pseudotsuga menziesii var. menziesii
Fir, Fraser	Abies fraseri

(Continued)

TABLE 4. Continued

Common Name	Genus/species
Fir, Giant	Abies grandis
Fir, Manchurian	Abies holophylla
Fir, Nikko	Abies homolepis
Fir, Nordmann	Abies nordmanniana
Fir, Vietch	Abies vietchii
Fir, White	Abies concolor
Fringe Tree	Chionanthus virginicus
Fringetree, Chinese	Chionanthus retusus
Ginkgo	Ginkgo biloba
Goldenrain-Tree	Koelreuteria paniculata
Hackberry, Common	Celtis occidentalis
Hackberry, Dwarf or Georgia	Celtis tenuifolia
Hawthorn, Arnold's	Crataegus mollis var. arnoldiana
Hawthorn, Black	Crataegus douglasii
Hawthorn, Cockspur	Crataegus crus-galli
Hawthorn, Dotted	Crataegus punctata
Hawthorn, Douglas	Crataegus douglasii
Hawthorn, Downy	Crataegus mollis
Hawthorn, Frosted	Crataegus pruinosa
Hawthorn, Green	Crataegus viridis
Hawthorn, Oneseed	Crataegus monogyra
Hawthorn, Paul's Scarlet	Crataegus laevigata
Hawthorn, Pear	Crataegus calpodendron
Hawthorn, Russian	Crataegus pinnatifida
Hawthorn, Washington	Cragaegus phaenopyrum
Hazelnut, American	Corylus americana
Hemlock, Carolina	Tsuga caroliniana
Hemlock, Eastern	Tsuga canadensis
Hickory, Bitternut	Carya cordiformis
Hickory, Pignut	Carya glabra
Hickory, Shagbark	Carya ovata
Hickory, Shellbark	Carya laciniosa
Highbush-Cranberry	Viburnum opulus or V. trilobum
Hobblebush	Viburnum alnifolium
Holly, American	Ilex opaca
Holly, Michigan	Ilex verticillata
Holly, Mountain	Nemopanthus mucronatus
Honey-Locust	Gleditsia triacanthos
Honey-Locust, Thornless	Gleditsia triacanthos var. inermis
Hop-hornbeam, Eastern	Ostrya virginiana
Hop-tree	Ptelea trifoliata
Hornbeam, American	Carpinus caroliniana
Horse-Chestnut	Aesculus hippocastanum
Horse-Chestnut, Red	Aesculus ×carnea
Indigo, False	Amorpha fruticosa
Ironwood	Ostrya virginiana
Juniper, Common	Juniperus communis
Juniper, Ground	Juniperus communis var. depressa
Katsuratree	Cercidiphyllum japonicum
Larch, European	Larix decidua
Lilac	Syringa vulgaris
Lilac, Japanese	Syringa reticulata
Linden, European	Tilia cordata

(Continued)

TABLE 4. Continued

Common Name	Genus/species
Linden, Kaiser	Tilia ×europea 'Pallida'
Linden, Silver	Tilia tomentosa
Locust, Black	Robinia pseudoacacia
Locust, Honey	Gleditsia triacanthos
Locust, Pink Idaho	Robinia ×ambigua
Locust, Thornless	Gleditsia triacanthos var. inermis
Magnolia, Anise	Magnolia salicifolia
Magnolia, Cucumber	Magnolia acuminata
Magnolia, Loebner	Magnolia ×loebneri
Magnolia, Merrill	Magnolia ×loebneri cv Merrill
Magnolia, Saucer	Magnolia ×soulangeana
Magnolia, Star	Magnolia stellata cv Royal Star
Magnolia, Umbrella	Magnolia tripetala
Maple, Amur	Acer ginnala
Maple, Black	Acer nigrum
Maple, Hedge	Acer campestre
Maple, Kurozi-Itaya	Acer mayrii
Maple, Manchurian	Acer mandchuricum
Maple, Mountain	Acer spicatum
Maple, Norway	Acer platanoides
Maple, Paperbark	Acer griseum
Maple, Red	Acer rubrum
Maple, Schwedler	Acer platanoides var. schwedleri
Maple, Silver	Acer saccharinum
Maple, Striped	Acer pensylvanicum
Maple, Sugar	Acer saccharum
Maple, Sycamore	Acer pseudoplatanus
Maple, Trident	Acer buergeridanum
Mimosa	Albizzia julibrissin
Mountain-ash, American	Sorbus americana
Mountain-ash, European	Sorbus aucuparia
Mountain-ash, Showy	Sorbus decora
Mulberry, Red	Morus rubra
Mulberry, White	Morus alba
Mulberry, Weeping White	Morus alba var. pendula
Nannyberry	Viburnum lentago
Oak, Bebb's	Quercus macrocarpa × alba
Oak, Bebb's	Quercus ×bebbiana
Oak, Black	Quercus velutina
Oak, Bottom	Quercus ×runcinata
Oak, Bur	Quercus macrocarpa
Oak, Chestnut	Quercus prinus
Oak, Chinkapin	Quercus muehlenbergii
Oak, Deam	Quercus alba × Q. muehlenbergii
Oak, Dwarf Chestnut	Quercus prinoides
Oak, English	Quercus robur
Oak, Hawkins	Quercus rubra × Q. velutina
Oak, Jack	Quercus bicolor × Q. alba or Q. ×jackiana
Oak, Northern Pin	Quercus ellipsoidalis
Oak, Pin	Quercus palustris
Oak, Post	Quercus stellata
Oak, Red/Northern	Quercus rubra
Oak, Sawtooth	Quercus acutissima

(Continued)

TABLE 4. Continued

Common Name	Genus/species
Oak, Scarlet	Quercus coccinea
Oak, Schuette	Quercus ×schuettii
Oak, Shingle	Quercus imbricaria
Oak, Shumard or Southern Red	Quercus shumardii
Oak, Swamp White	Quercus bicolor
Oak, Turkey	Quercus cerris
Oak, White	Quercus alba
Osage-Orange	Maclura pomifera
Pagodatree, Japanese	Sophora japonica
Pawpaw	Asimina triloba
Pear, Callery 'Autumn Blaze'	Pyrus calleryana 'Autumn Blaze'
Pear, Common	Pyrus communis
Pecan	Carya illinoensis
Persimmon	Diospyros virginiana
Pine, Austrian (or Black)	Pinus nigra
Pine, Bristlecone	Pinus aristata
Pine, Eastern White	Pinus strobus
Pine, Giant Mugo	Pinus uncinata
Pine, Himalayan	Pinus wallichiana
Pine, Jack	Pinus banksiana
Pine, Japanese Red	Pinus densiflora
Pine, Japanese Umbrella	Pinus densiflora var. umbraculifera
Pine, Japanese White	Pinus parviflora var. glauca
Pine, Jeffrey	Pinus jeffreyi
Pine, Limber	Pinus flexilis
Pine, Lodge-pole	Pinus contorta var. latifolia
Pine, Macedonian	Pinus puece
Pine, Mugo	Pinus mugo
Pine, Pacific Ponderosa	Pinus ponderosa var. ponderosa
Pine, Pitch	Pinus rigida
Pine, Ponderosa	Pinus ponderosa
Pine, Red	Pinus resinosa
Pine, Scotch	Pinus sylvestris
Pine, SW White	Pinus strobiformis
Pine, Swiss Stone	Pinus cembra
Pine, Virginia	Pinus virginiana
Planetree, London	Platanus ×acerifolia
Plum, American	Prunus americana
Poplar, Balsam	Populus balsamifera
Poplar, Lombardy	Populus nigra var. italica
Poplar, White	Populus alba
Prickly-Ash	Zanthoxylum americanum
Red-Cedar, Eastern	Juniperus virginiana
Red-Cedar, Burk	Juniperus virginiana var. burki
Redbud, Eastern	Cercis canadensis
Redbud, Eastern White	Cercis canadensis f. alba
Redwood, Dawn	Metasequoia glyptostroboides
Russian-Olive	Elaeagnus angustifolia
Sassafras	Sassafras albidum
Sequoia, Giant	Sequoiadendron giganteum
Serviceberry, Downy	Amelanchier arborea
Serviceberry, Roundleaf	Amelanchier sanguinea
Serviceberry, Allegheny	Amelanchier laevis

(Continued)

TABLE 4. Continued

Common Name	Genus/species
Smoketree	Cotinus coggygria
Smoketree, American	Cotinus obovatus
Sour-gum	Nyssa sylvatica
Spicebush	Lindera benzoin
Spindle Tree	Euonymus europaea
Spruce, Black	Picea mariana
Spruce, Colorado Blue	Picea pungens
Spruce, Norway	Picea abies
Spruce, Serbian	Picea omorika
Spruce, Spartan	Picea glauca × Picea pungens
Spruce, White	Picea glauca
Sumac, Poison	Toxicodendron vernix
Sumac, Shining	Rhus copallina
Sumac, Smooth	Rhus glabra
Sumac, Staghorn	Rhus typhina
Sweetgum	Liquidambar styraciflua
Sycamore	Platanus occidentalis
Tamarack, Eastern	Larix laricina
Tree-Of-Heaven	Ailanthus altissima
Tulip-tree/Poplar, Yellow	Liriodendron tulipifera
Tupelo	Nyssa sylvatica
Viburnum or Hobblebush	Viburnum alnifolium
Viburnum, Double-file	Viburnum plicatum var. tomentosum
Viburnum, Fragrant	Viburnum ×carlcephalum
Walnut, Black	Juglans nigra
Walnut, English	Juglans regia
White-cedar, Northern	Thuja occidentalis
Willow, Autumn	Salix serissima
Willow, Balsam	Salix pyrifolia
Willow, Bebb's	Salix bebbiana
Willow, Black	Salix nigra
Willow, Crack	Salix fragilis
Willow, Golden	Salix alba var. tristis
Willow, Meadow	Salix petiolaris
Willow, Peachleaf	Salix amygdaloides
Willow, Pussy	Salix discolor
Willow, Sandbar	Salix exigua
Willow, Weeping	Salix babylonica
Willow, White	Salix alba
Witch-Hazel	Hamamelis virginiana
Yellow Poplar	Liriodendron tulipifera
Yellow-wood	Cladrastis kentukea or C. lutea
Yew, Halloran	Taxus media 'Halloran'
Zelkova, Japanese	Zelkova serrata

ion as to whether the varieties of a species should be recognized as separate species. Unfortunately, both of these types of problems occur in our most common trees, oaks and maples.

Where more than one champion tree of a given species is listed, it is likely due to the designation of co-champions or situations where the state and one-time national champions are different trees. There are also cases where only the

girth is known for recently discovered trees. In these cases the current or past champions, for which complete data are known, are also listed. Finally, in other cases, large individuals of a particular species of tree are listed because they likely represent the upcoming state or national champions (should current champions die) and should be monitored.

The measurements in Table 2 are given as inches at 4½ feet above the ground for girth and as feet for height and average crown spread. In most cases these measurements were made in accordance with the specifications given above. Periodically, when a tree is re-measured it is found to have a lesser height or average crown spread. This is usually due to a loss of branches caused by a storm since the earlier measurements were made. The date of the most recent measurement is given in the last column of Table 2. Some of these trees haven't been re-measured in many years. All interested parties are urged to join the search for them and to report their current measurements.

The Town column of Table 2 may indicate the city in which a tree or shrub exists or, where more useful, the name of the township. For some entries, a state park may be listed or the name of a lake or other recognized area if it is likely to be helpful in finding the location.

The location column provides the best information available in the state's big tree records. In many cases it is both exact and accurate, e.g. a street address or intersection. In other cases, the information is more vague, e.g. near Sleeping Bear Dunes. In some cases hand drawn maps are available in the files.

The observer(s) column in Table 2 lists over 160 people who have been directly involved over the years in reporting on the trees and shrubs of Michigan. Many more have probably been involved but their names are lost. Among this large group of people, ten stand out as being frequent contributors. In addition to the author of this paper, they are Stu Bassett, Robert Bloye, Jeff Boddy, Joe Kaplan, Gail McPherson, H. J .Neff, Richard Pomorski , John Spencer and, of course, Paul Thompson. Without the steadfast and long- term involvement of these ten, there would be no Big Tree and Shrub Program in Michigan. The Michigan Botanical Club owes them a profound debt of gratitude.

Table 3 (alphabetical list of abbreviations), 4 (common names) and 5 (county lists) are included here to serve various interests. Table 3 should be helpful to readers not familiar with some of the abbreviations used in table 2. Table 4 should be useful to those who rely on common names more than technical botanical names. The common names are listed in reverse order, e.g. Oak, Bebb's rather than Bebb's Oak to keep all the oaks together, the Norway Maple with the other maples, etc. Table 5 is included for the convenience of those interested in one or more counties. These often include local newspaper writers or editors, magazine writers or editors, those organizing big tree bus or field trips, and local boards, commissions and other political entities.

TABLE 5. County List of Michigan's Big Trees and Shrubs.

ALLEGAN	
Acer nigrum *	**Maple, Black**
Acer saccharum	Maple, Sugar
Alnus rugosa	Alder, Speckled
Catalpa bignonioides	Catalpa, Southern
Celtis occidentalis	**Hackberry, Common**
Juglans cinerea	Butternut
Morus alba	Mulberry, White
Morus alba var. pendula	**Mulberry, Weeping White**
Quercus alba	**Oak, White**
Quercus rubra	**Oak, Red/Northern**
Sassafras albidum	Sassafras
ANTRIM	
Aesculus hippocastanum	Horse-Chestnut
Fraxinus americana	Ash, White
Juglans nigra	Walnut, Black
Prunus armeniaca	Apricot
BARRY	
Amelanchier arborea	**Serviceberry, Downy**
BAY	
Quercus bicolor	Oak, Swamp White
BENZIE	
Cornus stolonifera	**Dogwood, Red Osier**
Populus grandidentata	Aspen, Bigtooth
Quercus robur	**Oak, English**
Salix amygdaloides	Willow, Peachleaf
Tsuga canadensis	Hemlock, Eastern
BERRIEN	
Acer saccharinum	Maple, Silver
Cercis canadensis	Redbud, Eastern
Liriodendron tulipifera	Tuliptree/Poplar, Yellow
Maclura pomifera	Osage-orange
Magnolia acuminata	**Magnolia, Cucumber**
Magnolia ×soulangeana	**Magnolia, Saucer**
Morus rubra	**Mulberry, Red**
Platanus occidentalis	**Sycamore**
Quercus macrocarpa	**Oak, Bur**
Quercus prinoides	**Oak, Dwarf Chestnut**
Rhus copallina	Sumac, Shining
Sassafras albidum	Sassafras
Taxodium distichum	**Baldcypress**
BRANCH	
Aesculus glabra	**Buckeye, Ohio**
Celtis occidentalis	Hackberry, Common
Larix decidua	Larch, European
Liriodendron tulipifera	**Tuliptree/ Yellow Poplar**
Prunus cerasus	Cherry, Common Sour

(Continued)

*indicates current or former National Champions. Bold face indicates State Champions.

TABLE 5. Continued

Quercus alba	Oak, White
Quercus ×runcinata	**Oak, Bottom**
CALHOUN	
Abies concolor	Fir, White
Abies veitchii	**Fir, Veitch**
Liquidambar styraciflua	Sweetgum
Pinus flexilis	**Pine, Limber**
Prunus cerasus *	**Cherry, Common Sour**
Pseudotsuga menziesii var. menziesii	**Douglas-Fir**
Quercus acutissima	**Oak, Sawtooth**
Quercus imbricaria	**Oak, Shingle**
Quercus rubra	Oak, Red/Northern
Quercus velutina	Oak, Black
Tilia cordata	**Linden, European**
CASS	
Carya cordiformis	**Hickory, Bitternut**
Fraxinus pennsylvanica*	**Ash,Green**
Nyssa sylvatica	**Tupelo**
Phellodendron amurense	Corktree, Amur
Quercus velutina	Oak, Black
Rhus typhina	**Sumac, Staghorn**
Sassafras albidum	Sassafras
Ulmus thomasii*	**Elm, Rock**
CHARLEVOIX	
Ostrya virginiana	**Ironwood, E. Hophornbeam**
Populus alba *	**Poplar, White**
Ulmus americana	Elm, American
CHEBOYGAN	
Betula papyrifera*	**Birch, Paper**
Picea glauca	**Spruce, White**
Pinus banksiana	Pine, Jack
CHIPPEWA	
Crataegus douglasii	**Hawthorn, Douglas**
Populus deltoides	Cottonwood, Eastern
Populus nigra var. italica	Poplar, Lombardy
Salix pyrifolia	**Willow, Balsam**
CLARE	
Ostrya virginiana	Ironwood/E Hophornbeam
CLINTON	
Quercus bicolor	Oak, Swamp White
DELTA	
Acer spicatum	Maple, Mountain
Populus grandidentata	Aspen, Bigtooth
EATON	
Catalpa speciosa	Catalpa, Northern
Elaeagnus angustifolia	**Russian-olive**

(Continued)

TABLE 5. Continued

Quercus macrocarpa × Quercus alba	Oak, Bebbs
Ulmus thomasii	Elm, Rock
EMMET	
Tsuga canadensis	**Hemlock, Eastern**
GENESEE	
Carya laciniosa	**Hickory, Shellbark**
Quercus velutina	Oak, Black
GOGEBIC	
Picea glauca	**Spruce, White**
Pinus resinosa*	**Pine, Red**
GRAND TRAVERSE	
Abies nordmanniana	**Fir, Nordman**
Acer platanoides	Maple, Norway
Acer saccharum	**Maple, Sugar**
Castanea dentata	Chestnut, American
Juniperus virginiana	Red-cedar, Eastern
Ostrya virginiana *	**Ironwood**
Picea abies	Spruce, Norway
Pinus nigra	Pine, Austrian
Quercus robur	Oak, English
Sorbus aucuparia	**Mountain Ash, European**
Tilia americana	Basswood
Ulmus thomasii	Elm, Rock
HILLSDALE	
Ginkgo biloba	**Ginkgo**
Juglans cinerea	**Butternut**
Quercus coccinea	**Oak, scarlet**
Quercus macrocarpa	Oak, Bur
Rhus glabra	**Sumac, Smooth**
Robinia pseudoacacia	**Locust, Black**
HOUGHTON	
Acer spicatum*	**Maple, Mountain**
Amelanchier laevis	Serviceberry, Allegheny
Sorbus americana	**Mountain Ash, American**
Sorbus decora	Mountain Ash, Showy
HURON	
Betula papyrifera*	**Birch, Paper**
Salix alba	Willow, White
INGHAM	
Abies concolor	Fir, White
Abies grandis	**Fir, Giant**
Abies holophylla	**Fir, Manchurian**
Abies homolepis	Fir, Nikko
Abies nordmanniana	Fir, Nordman
Acer buergerianum	**Maple, Trident**
Acer campestre	Maple, Hedge
Acer ginnala	Maple, Amur

(Continued)

TABLE 5. Continued

Acer griseum	**Maple, Paperbark**
Acer mandschuricum	**Maple, Manchurian**
Acer mayrii	**Maple, Kurozi-Itaya**
Acer platanoides var. schwedleri	**Maple, Schwedler**
Acer pseudoplatanus	Maple, Sycamore
Amelanchier arborea	Serviceberry, Downy
Betula occidentalis	**Birch, Western Paper**
Catalpa speciosa *	**Catalpa Northern**
Cercidophyllum japonicum	**Katsura**
Cercis canadensis forma alba	**Redbud, Eastern White**
Chamaecyparis nootkatensis	**Alaska-Cedar**
Chionanthus retusus	**Fringetree, Chinese**
Cladrastis kentukea	Yellow-wood
Cornus florida forma rubra	**Dogwood, Flowering, Red**
Cornus kousa var. chinensis	**Dogwood, Chinese**
Cornus mas	**Cornelian Cherry**
Cotinus coggygria	**Smoketree, Common**
Crataegus calpodendron	**Hawthorn, Pear**
Crataegus laevigata	**Hawthorn, Paul's Scarlet**
Crataegus mollis var. arnoldiana	**Hawthorn, Arnold's**
Crataegus monogyra	Hawthorn, One-seed
Crataegus phaenopyrum	Hawthorn, Washington
Crataegus pinnatifida	**Hawthorn, Russian**
Crataegus pruinosa	**Hawthorn, Frosted**
Crataegus viridus	**Hawthorn, Green**
Cryptomeria japonica	**Cedar, Japanese**
Cryptomeria japonica var. lobbii	**Cedar, Japanese**
Euonymus europaea	Spindle Tree
Fagus sylvatica	Beech, European
Fagus sylvatica cv spatheana	Beech, European Spaeth
Fagus sylvatica var. laciniata	Beech, European Cut-leaf
Fagus sylvatica var. pendula	Beech, European Weeping
Fagus sylvatica var. purpurea	**Beech, European, Purple Leaf**
Fraxinus quadrangulata	Ash, Blue
Ginkgo biloba	Ginkgo
Gleditsia triacanthos var. inermis	Honey Locust, Thornless
Ilex opaca	Holly, American
Juniperus virginiana var. burki	**Red-cedar, Burk**
Koelreuteria paniculata	**Goldenrain-Tree**
Magnolia salicifolia	**Magnolia, Anise**
Magnolia stellata cv Royal Star	**Magnolia, Star**
Magnolia ×loebneri	Magnolia, Loebner
Magnolia ×loebneri cv Merrill	**Magnolia, Merrill**
Malus 'Bob White'	**Crabapple, Bob White**
Malus 'Mary Potter'	**Crabapple, Mary Potter**
Malus floribunda	**Crabapple, Japanese Flowering**
Malus fusca	**Crabapple, Oregon**
Malus hupehensis	**Crabapple, Tea**
Malus sieboldii var. zuni cv calocarpa	**Crabapple, Redbud**
Malus × 'Barbara Ann'	**Crabapple, Barbara Ann**
Malus ×scheideckeri	**Crabapple, Scheideckeri**
Metasequoia glyptostroboides	**Redwood, Dawn**
Phellodendron amurense	**Corktree, Amur**
Picea glauca × Picea pungens	**Spruce, Spartan**
Picea omorika	**Spruce, Serbian**

(Continued)

TABLE 5. Continued

Picea pungens	Spruce, Colorado Blue
Pinus aristata	**Pine, Bristlecone**
Pinus cembra	**Pine, Swiss Stone**
Pinus contorta var. latifolia	**Pine, Lodge-pole**
Pinus densiflora	**Pine, Japanese Red**
Pinus densiflora var. umbraculifera	**Pine, Japanese Umbrella**
Pinus flexilis	Pine, Limber
Pinus jeffreyi	**Pine, Jeffrey**
Pinus mugo	**Pine, Mugo**
Pinus nigra	**Pine, Austrian**
Pinus parviflora var. glauca	**Pine, Japanese White**
Pinus peuce	**Pine, Macedonian**
Pinus ponderosa var. ponderosa	**Pine, Pacific Ponderosa**
Pinus rigida	**Pine, Pitch**
Pinus strobiformis	**Pine, SW White**
Pinus uncinata	**Pine, Giant Mugo**
Pinus virginiana	**Pine, Virginia**
Pinus wallichiana	**Pine, Himalayan**
Platanus occidentalis	Sycamore
Platanus ×acerifolia	**Planetree, London**
Prunus avium	Cherry, Sweet
Prunus avium 'plena'	**Cherry, Double Sweet**
Prunus serrulata 'Shirotae'	**Cherry, Oriental Snow White**
Prunus virginiana	Cherry, Choke
Pseudotsuga menziesii var. glauca	**Douglas-Fir, Rocky Mountain**
Pyrus calleryana 'Autumn Blaze'	**Pear, Callery 'Autumn Blaze'**
Quercus cerris	**Oak, Turkey**
Quercus prinus	**Oak, Chestnut**
Quercus robur	Oak, English
Quercus stellata	**Oak, Post**
Rhamnus cathartica	Buckthorn, European
Sophora japonica	Pagoda, Japanese
Taxus media 'Halloran'	**Yew, 'Halloran'**
Tetradium danielli	**Euodia, Korean**
Thuja orientalis	**Arborvitae, Oriental**
Tilia americana	**Basswood**
Tilia tomentosa	**Linden, Silver**
Tilia ×europea 'Pallida'	**Linden, Kaiser**
Ulmus glabra	Elm, Wych
Ulmus minor	**Elm, Smooth-Leaved**
Ulmus minor var vulgaris	**Elm, English**
Ulmus parvifolia	**Elm, Chinese**
Ulmus rubra	Elm, Slippery
Ulmus thomasii	Elm, Rock
Ulmus ×hollandica	**Elm, Klemmer Dutch**
Viburnum plicatum var. tomentosum	**Viburnum, Double File**
Viburnum ×carlcephalum	**Viburnum, Fragrant**
Zelkova serrata	**Zelkova, Japanese**
IONIA	
Abies concolor	**Fir, White**
Catalpa speciosa	Catalpa, Northern
Juniperus virginiana	**Red-Cedar, Eastern**
Maclura pomifera	Osage-orange
Quercus alba	Oak, White
Quercus bicolor	Oak, Swamp White

(Continued)

TABLE 5. Continued

IRON	
Pinus banksiana	**Pine, Jack**
ISABELLA	
Picea mariana	**Spruce, Black**
JACKSON	
Acer campestre	Maple, Hedge
Acer saccharinum	Maple, Silver
Betula ×purpusii	**Birch, Hybrid**
Carya glabra	Hickory, Pignut
Catalpa speciosa	Catalpa, Northern
Cotinus obovatus	**Smoketree, American**
Fagus sylvatica var. atropunicea	**Beech, Copper**
Magnolia acuminata	Magnolia, Cucumber
Magnolia tripetala	**Magnolia, Umbrella**
Picea abies	Spruce, Norway
Prunus serotina	Cherry, Wild Black
Quercus coccinea	Oak, Scarlet
Quercus prinus	Oak, Chestnut
Quercus rubra × Quercus velutina	**Oak, Hawkins**
Robinia pseudoacacia	Locust, Black
Sassafras albidum	**Sassafras**
Tilia platyphylla	**Basswood, Large-leaved**
KALAMAZOO	
Acer campestre	**Maple, Hedge**
Acer saccharinum	Maple, Silver
Aesculus octandra	**Buckeye, Yellow**
Aesculus pavia	**Buckeye, Red**
Aesculus ×carnea	**Horse-Chestnut, Red**
Albizzia julibrissin	**Mimosa**
Betula nigra	Birch, River
Carya glabra	Hickory, Pignut
Carya illinoensis	**Pecan**
Castanea mollissima	**Chestnut, Chinese**
Chamaecyparis obtusa	**False Cypress, Hinoki**
Fagus grandifolia var. pendula	**Beech, American Weeping**
Fagus sylvatica	**Beech, European**
Fagus sylvatica var. atropunicea	Beech, Copper
Fagus sylvatica var. laciniata	**Beech, European Cutleaf**
Fagus sylvatica var. pendula	Beech, European Weeping
Fagus sylvatica var. tricolor	**Beech, Tricolor**
Juglans nigra	**Walnut, Black**
Liquidambar styraciflua	**Sweetgum**
Liriodendron tulipifera	Tuliptree/Poplar, Yellow
Maclura pomifera	**Osage-orange**
Morus alba	Mulberry, White
Picea abies	Spruce, Norway
Pinus nigra	Pine, Austrian
Pinus ponderosa	**Pine, Pondorosa**
Platanus occidentalis	Sycamore
Platanus ×acerifolia	Planetree, London
Prunus pensylvanica	**Cherry, Pin**
Prunus serotina	Cherry, Wild Black

(Continued)

TABLE 5. Continued

Quercus coccinea	Oak , Scarlet
Quercus macrocarpa × Quercus alba	Oak, Bebbs
Quercus palustris	Oak, Pin
Quercus rubra	Oak, Red/Northern
Rhamnus cathartica	Buckthorn, European
Rhus copallina *	**Sumac, Shining**
Syringa reticulata	**Lilac, Japanese**
Taxodium distichum var. distichum	**Bald Cypress**
Ulmus ×vegeta	**Elm, Camperdown**
KENT	
Castanea dentata	**Chestnut , American**
Catalpa bignonioides	**Catalpa, Southern**
Diospyros virginiana	**Persimmon**
Juglans cinerea	Butternut
Prunus virginiana	Cherry, Choke
Ptelea trifoliata *	**Hoptree, Common**
Salix babylonica	Willow, Weeping
KEWEENAW	
Amelanchier sanguinea	**Serviceberry, Roundleaf**
Betula allegheniensis	Birch, Yellow
Pinus strobus	Pine, Eastern White
Sambucus pubens	**Elderberry, Red**
LAKE	
Larix laricina	**Tamarack, Eastern**
LAPEER	
Quercus macrocarpa	Oak, Bur
LEELANAU	
Acer platanoides	**Maple, Norway**
Acer saccharum	**Maple, Sugar**
Acer spicatum	Maple, Mountain
Amelanchier laevis	**Serviceberry, Allegheny**
Betula papyrifera var. cordifolia *	**Birch, Mountain Paper**
Betula pendula	**Birch, European White**
Fagus sylvatica var. atropunicea	Beech, Copper
Fraxinus americana	**Ash, White**
Juniperus communis var. depressa	**Juniper Ground**
Nemopanthus mucronatus	Holly, Mountain
Populus tremuloides	Aspen, Quaking
Prunus armeniaca	**Apricot**
Prunus pensylvanica	Cherry, Pin
Salix amygdaloides	Willow, Peachleaf
Salix bebbiana	**Willow, Bebbs**
Salix discolor	Willow, Pussy
Salix petiolaris *	**Willow, Meadow**
Sambucus canadensis	**Elderberry, Common**
Sorbus americana	**Mountain Ash, American**
Thuja occidentalis *	**Cedar, White or ArborVitae**
Tilia americana	Basswood

(Continued)

TABLE 5. Continued

LENAWEE	
Catalpa bignonioides	**Catalpa, Southern**
Cornus alternifolia	**Dogwood, Alternate Leaf**
Euonymus alata	**Euonymus, Winged**
Fagus grandifolia	Beech, American
Fraxinus nigra *	**Ash, Black**
Fraxinus quadrangulata	**Ash, Blue**
Gleditsia triacanthos var. inermis *	**Locust, Thornless**
Gymnocladus dioicus	Coffeetree, Kentucky
Juglans nigra	Walnut, Black
Larix decidua	**Larch, European**
Magnolia acuminata	**Magnolia, Cucumber**
Morus alba	**Mulberry, White**
Pinus nigra	Pine, Austrian
Pinus sylvestris	**Pine, Scotch**
Platanus occidentalis	**Sycamore**
Quercus macrocarpa	Oak, Bur
Salix alba	Willow, White
Sorbus aucuparia	Mountain Ash, European
Zanthoxylum americanum	**Prickly-Ash**
LIVINGSTON	
Acer negundo	Box Elder
Fraxinus americana	Ash, White
Prunus cerasus	Cherry, Common Sour
Quercus bicolor × Quercus alba (Q. jackiana)	**Oak, Jack**
Quercus coccinea	Oak, Scarlet
Salix babylonica *	**Willow, Weeping**
Ulmus pumila	Elm, Siberian
LUCE	
Abies balsamea	Fir, Balsam
Acer saccharinum *	**Maple, Silver**
Pinus resinosa	Pine, Red
MACKINAC	
Abies balsamea	Fir, Balsam
Acer pensylvanicum	Maple, Striped
Betula allegheniensis	**Birch, Yellow**
Sambucus pubens	Elderberry, Red
Sorbus decora *	**Mountain Ash, Showy**
Syringa vulgaris	**Lilac**
Ulmus ×vegeta	**Elm, Camperdown**
MACOMB	
Acer nigrum	Maple, Black
Acer rubrum	Maple, Red
Aesculus hippocastanum	Horse-Chestnut
Gymnocladus dioicus	Coffeetree, Kentucky
Ilex opaca	**Holly, American**
Juglans nigra	Walnut, Black
Nyssa sylvatica	Tupelo
Populus alba	**Poplar, White**

(Continued)

TABLE 5. Continued

Quercus velutina	Oak, Black
Salix amygdaloides	**Willow, Peachleaf**
Salix exigua	Willow, Sandbar
Salix fragilis *	**Willow, Crack**
Staphylea trifoliata	**Bladdernut, American**
Ulmus glabra	Elm, Wych
MANISTEE	
Acer pseudoplatanus	**Maple, Sycamore**
Acer saccharum	Maple, Sugar
Castanea dentata	Chestnut, American
Fagus grandifolia	**Beech, American**
Fagus sylvatica var. heterophylla	**Beech, Fernleaved**
Metasequoia glyptostroboides	Redwood, Dawn
Sequoiadendron giganteum	**Sequoia, Giant**
MARQUETTE	
Abies balsamea	Fir, Balsam
Acer pensylvanicum	**Maple, Striped**
Pinus banksiana	Pine, Jack
Pinus strobus	Pine, Eastern White
Populus balsamifera *	**Poplar, Balsam**
Populus grandidentata *	**Aspen, Bigtooth**
Populus nigra var. italica	**Poplar, Lombardy**
MASON	
Acer saccharum	Maple, Sugar
Juglans regia	**Walnut, English**
MENOMINEE	
Populus balsamifera	Poplar, Balsam
MONROE	
Carya glabra	**Hickory Pignut**
Celtis occidentalis	Hackberry, Common
Cladrastis kentukea	**Yellow-wood**
Ginkgo biloba	**Ginkgo**
Sophora japonica	**Pagoda, Japanese**
MONTCALM	
Acer saccharinum	Maple, Silver
Quercus bicolor	Oak, Swamp White
MONTMORENCY	
Picea glauca	Spruce, White
MUSKEGON	
Hamamelis virginiana	**Witch-hazel**
OAKLAND	
Abies concolor	**Fir, White**
Acer nigrum	Maple, Black
Acer saccharinum	Maple, Silver
Amelanchier arborea	Serviceberry, Downy
Amelanchier sanguinea	Serviceberry, Roundleaf

(Continued)

TABLE 5. Continued

Aralia spinosa	**Devil's Walking Stick**
Aronia melanocarpa	**Chokeberry**
Carpinus caroliana	**Hornbeam, American**
Carya glabra	Hickory, Pignut
Carya ovata	Hickory, Shagbark
Catalpa speciosa	Catalpa, Northern
Cephalanthus occidentalis	**Buttonbush**
Cercis canadensis	Redbud, Eastern
Chionanthus virginicus	**Fringe Tree**
Cladrastis kentukea	Yellow-wood
Cornus alternifolia	**Dogwood, Alternate leaved**
Cornus purpusii	**Dogwood, Silky**
Cornus racemosa	Dogwood, Gray
Corylus americana	Hazelnut
Cotinus coggygria	**Smoketree. Common**
Crataegus mollis	**Hawthorn, Downy**
Crataegus phaenopyrum	**Hawthorn, Washington**
Crataegus punctata	**Hawthorn, Dotted**
Cryptomeria japonica var. lobbii	Cedar, Japanese
Elaeagnus angustifolia	Russian-olive
Euonymus atropurpurea	Burning Bush
Fagus sylvatica	Beech, European
Fagus sylvatica var. pendula	**Beech, European Weeping**
Fraxinus pensylvanica	Ash, Green
Hamamelis virginiana	Witch-Hazel
Juglans nigra	Walnut, Black
Juniperus virginiana	Red-Cedar, Eastern
Liquidambar styraciflua	Sweetgum
Malus ioensis *	**Crab, Prairie**
Malus pumila	**Apple, Common**
Malus sylvestris	**Apple Common**
Metasequoia glyptostroboides	Redwood, Dawn
Nemopanthus mucronatus *	**Holly, Mountain**
Picea abies	Spruce, Norway
Picea pungens	Spruce, Colorado Blue
Prunus americana	Plum, American
Prunus armeniaca	Apricot
Prunus avium	Cherry, Sweet
Pyrus communis	Pear, Common
Quercus bicolor × Quercus alba (Q. jackiana)	Oak, Jack
Quercus ellipsoidalis	Oak, Northern Pin
Quercus macrocarpa	Oak, Bur
Quercus macrocarpa × Quercus alba	Oak, Bebbs
Quercus muehlenbergii	Oak, Chinkapin
Quercus schuettii	Oak, Schuette
Rhamnus frangula *	**Buckthorn, Glossy**
Rhus typhina	Sumac, Staghorn
Salix alba var. tristis	Willow, Golden
Salix fragilis *	Willow, Crack
Salix serissima *	**Willow, Autumn**
Sambucus canadensis	Elderberry, Common
Sophora japonica	Pagoda, Japanese
Thuja occidentalis	Cedar, white or Arbor Vitae
Toxicodendron vernix	Sumac. Poison

(Continued)

TABLE 5. Continued

Tsuga caroliniana	**Hemlock, Carolina**
Ulmus americana	Elm, American
Ulmus pumila	Elm, Siberian
Ulmus rubra	**Elm, Slippery**
Viburnum lentago *	**Nannyberry**
Viburnum prunifolium	**Black Haw**
Viburnum trilobum or V. opulus *	**Highbush – Cranberry**
Zanthoxylum americanum*	**Prickly-Ash**
OCEANA	
Carya cordiformis	Hickory, Bitternut
Juglans nigra	Walnut, Black
Larix larcina	Tamarack, Eastern
ONTONAGAN	
Abies balsamea	**Fir, Balsam**
Betula allegheniensis	Birch, Yellow
Fraxinus nigra	Ash, Black
Pinus resinosa	Pine, Red
Pinus strobus *	**Pine, Eastern White**
Populus tremuloides *	**Aspen, Quaking**
Tsuga canadensis	Hemlock, Eastern
Ulmus rubra	Elm, Slippery
OSCEOLA	
Acer saccharum	Maple, Sugar
Thuja occidentalis	Cedar, White or Arbor Vitae
OTTAWA	
Alnus rugosa	Alder, Speckled
Cornus florida	Dogwood, Flowering
Fagus grandifolia	Beech, American
Picea abies	**Spruce, Norway**
Prunus serotina	Cherry, Wild Black
Quercus coccinea	Oak, Scarlet
Ulmus pumila	**Elm, Siberian**
SAGINAW	
Pinus ponderosa	Pine, Ponderosa
SANILAC	
Aesculus glabra	**Buckeye, Ohio**
Fagus sylvatica var. atropunicea	Beech, Copper
Fraxinus americana	Ash, White
Juglans cinerea	Butternut
SCHOOLCRAFT	
Betula papyrifera	Birch, Paper
Populus nigra var. italica	Poplar, Lombardy
SHIAWASEE	
Carya cordiformis	**Hickory, Bitternut**
Morus rubra	Mulberry. Red
Quercus muehlenbergii	Oak, Chinkapin
Salix discolor	**Willow, Pussy**

(Continued)

TABLE 5. Continued

ST. CLAIR	
Acer rubrum	**Maple, Red**
Aesculus hippocastanum	Horse-Chestnut
Ailanthus altissima	Tree-of-Heaven
Alnus rugosa *	**Alder, Speckled**
Gleditsia triacanthos	Locust, Honey
Quercus macrocarpa	**Oak, Bur**
Quercus velutina	**Oak, Black**
Robinia ×ambigua	**Locust, Pink Idaho**
ST. JOSEPH	
Cornus florida	**Dogwood, Flowering**
VAN BUREN	
Asimina triloba	**Pawpaw**
Betula nigra	Birch, River
Cephalanthus occidentalis	Buttonbush
Gymnocladus dioicus	**Coffeetree, Kentucky**
Ilex verticillata	**Holly, Michigan**
Maclura pomifera	Orange, Osage
Prunus serotina *	**Cherry, Wild Black**
Quercus rubra	Oak, Red/Northern
Taxodium distichum var distichum	Bald Cypress
Ulmus pumila	Elm, Siberian
WASHTENAW	
Acer ginnala	**Maple, Amur**
Acer griseum	**Maple, Paperbark**
Acer negundo *	**Box Elder**
Acer saccharinum	Maple Silver
Ailanthus altissima	**Tree-of-Heaven**
Alnus glutinosa	Alder, Black
Amorpha fruticosa	**Indigo, Blue**
Betula nigra	**Birch, River**
Carya illinoensis	Pecan
Carya ovata	**Hickory, Shagbark**
Cedrus lebani	**Cedar of Lebanon**
Celtis tenuifolia *	**Hackberry, Dwarf or Georgia**
Cercidophyllum japonica	Katsuratree
Cercis canadensis	Redbud, Eastern
Chionanthus virginicus	Fringe Tree
Cladrastis kentukea	**Yellow-wood**
Corylus americana	**Hazelnut**
Diospyros virginiana	Persimmon
Euonymus atropurpurea	Burning Bush
Gleditsia triacanthos	Locust, Honey
Gleditsia triacanthos var. inermis	Locust, Thornless
Juglans regia	Walnut, English
Juniperus communis *	**Juniper, Common**
Magnolia ×soulangeana	Magnolia, Saucer
Prunus serotina	Cherry, Wild Black
Pseudotsuga menziesii var. menziesii	Douglas-Fir
Quercus alba	Oak, White
Quercus alba × Q. muehlenbergii	**Oak, Deam**
Quercus macrocarpa	Oak, Bur

(Continued)

TABLE 5. Continued

Quercus muehlenbergii	**Oak, Chinkapin**
Quercus ×runcinata	Oak, Bottom
Rhamnus cathartica *	**Buckthorn, European**
Rhamnus frangula	Buckthorn, Glossy
Salix discolor	Willow, Pussy
Salix nigra	Willow, Black
Ulmus americana	Elm, American
Ulmus parvifolia	Elm, Chinese
Ulmus procera	**Elm, English**
WAYNE	
Abies fraseri	**Fir, Fraser**
Abies homolepis	**Fir, Nikko**
Acer platanoides	Maple, Norway
Aesculus hippocastanum	**Horse-Chestnut**
Alnus glutinosa	**Alder, Black**
Betula nigra	Birch, River
Celtis occidentalis	Hackberry, Common
Cercis canadensis	**Redbud, Eastern**
Cornus racemosa	**Dogwood, Gray**
Crataegus crus-galli	**Hawthorn, Cockspur**
Crataegus mollis *	**Hawthorn, Downy**
Crataegus monogyra	**Hawthorn, Oneseed**
Crataegus sp.	Hawthorn
Euonymus atropurpurea *	**Burning Bush**
Euonymus europaea	**Spindle Tree**
Fagus sylvatica var. laciniata	Beech, European Cut-Leaf
Fraxinus pensylvanica	Ash , Green
Fraxinus profunda	**Ash, Pumpkin**
Gleditsia triacanthos	**Locust, Honey**
Gleditsia triacanthos var. inermis	Locust, Thornless
Lindera benzoin	**Spicebush**
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Tuliptree/Poplar, Yellow
Maclura pomifera	Osage-orange
Magnolia acuminata	Magnolia, Cucumber
Malus augustifolia	**Apple, Southern Crab**
Malus coronaria	**Apple, Crab**
Malus ioensis	Crab, Prairie
Nyssa sylvatica	Tupelo
Populus alba	Poplar, White
Populus deltoides	**Cottonwood, Eastern**
Prunus avium	Cherry, Sweet
Prunus virginiana	**Cherry, Choke**
Quercus bicolor	**Oak, Swamp White**
Quercus palustris	**Oak, Pin**
Quercus prinus	Oak, Chestnut
Quercus robur	Oak, English
Quercus rubra	Oak, Red/Northern
Quercus shumardii	**Oak, Shumard; Southern Red**
Rhus copallina	Sumac, Shining
Robinia pseudoacacia	Locust, Black
Salix alba	Willow, White
Salix exigua	**Willow, Sandbar**

(Continued)

TABLE 5. Continued

Salix nigra	Willow, Black
Staphylea trifoliata	Bladdernut, American
Ulmus americana	**Elm, American**
Ulmus glabra	**Elm, Wych**
Ulmus pumila	Elm, Siberian
Ulmus serotina	**Elm, September**
Viburnum alnifolium	**Hobble-bush**
Viburnum lentago	Nannyberry
Viburnum trilobum or V. opulus *	**Highbush-Cranberry**
Zanthoxylum americanum	Prickly-Ash
WEXFORD	
Picea pungens	**Spruce, Colorado Blue**

IMPROVING THE LISTS

The three greatest ways in which the current lists can be improved are: 1) determining if a listed tree or shrub still exists, 2) obtaining exact and accurate information on the location of each tree or shrub listed and 3) obtaining up to date measurements. It is hoped that users of the list will continue to supply such information to the State's Big Tree Coordinator and that each succeeding version of these lists will be better than the last.

ACKNOWLEDGMENTS

Several Western Michigan University students helped with the development of "The Michigan Big Tree and Shrub Inventory." In recent years the computer expertise of Mrs. Sarah Williams in updating the big tree and shrub database is particularly appreciated. The continuous help of my wife, Nancy, in preparation of the manuscript made this paper possible. The help of the Hanes Fund in supporting the state's big tree and shrub work is gratefully acknowledged.

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On the cover: *Elwood B. "Woody" Ehrle, Michigan Big Tree Coordinator, with a 52-inch slab from near the base of a Bur Oak tree felled in Bronson Park, Kalamazoo, in 2004. The tree has 223 annual rings. An acorn germinated and started the growth of this tree in 1781, the year that the Battle of Yorktown ended the Revolutionary War. It took 40 hours to prepare the slab for exhibition at the Kalamazoo Valley Museum in Kalamazoo. The exhibition will take place during the fall and winter of 2006–2007. Photo by Bill Scharmann.*

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THE VASCULAR FLORA AND COMMUNITY STRUCTURE OF LITTLE CALUMET HEADWATERS NATURE PRESERVE, LAPORTE COUNTY, INDIANA

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ABSTRACT

Little Calumet Headwaters Nature Preserve is a 108-acre tract of woodland and wetland areas that comprise the headwaters of the Little Calumet River in northwestern Indiana. The preserve, consisting of upland hardwood forests, groundwater seeps, and wetland complex, is an area of high diversity due to its topographical variation. A floristic inventory, plot sampling, and seed bank analysis were used to determine the structure and composition of the plant communities. The flora consists of 298 species (27 exotic) representing 188 genera and 84 families. Dominant vegetation of the forest includes *Liriodendron tulipifera, Prunus serotina, Packera aurea* and *Podophyllum peltatum*. Each groundwater seep contains similar plant communities with variant species that depend on water flow and topography. They include species such as *Symplocarpus foetidus*, *Impatiens capensis*, and *Caltha palustris* and lack an extensive woody overstory except for occasional *Salix* spp. or *Cornus* spp. The wetland complex contains three distinct areas: an open fen dominated by *Leersia oryzoides* and *Cornus* spp.; a marsh dominated by *Typha latifolia* and *Carex lasiocarpa*; and a shrub-carr portion dominated by *Symplocarpus foetidus*, *Cornus alternifolia*, and *Salix nigra*. A wetland seed bank study resulted in a total of 46 species representing 33 genera and 22 families. A similarity of 71.7% was determined between the seed bank samples and the above-ground vegetation. The entire preserve has a high floristic quality index (FQI) of 70.1 and average mean coefficient of conservatism of 4.1. The high FQI value is influenced by property size and the number of communities in the preserve.

Keywords: LaPorte County, flora, plant community, seed bank, wetland

INTRODUCTION

Little Calumet Headwaters Nature Preserve (LCHNP) is a 108-acre tract of woodland and wetlands that comprise the headwaters of the Little Calumet River in northwestern Indiana. The hill and valley topography of the Northwestern Moraine Natural Region (Jackson 1997) was historically covered with mesic forests consisting of *Fagus grandifolia*, *Acer saccharum*, *Populus deltoides*,

Quercus rubra, *Carya ovata*, and *Prunus serotina* (Post 1997). Fens, bogs, savannas, marshes, spring seeps, and swamps were also commonly found in the low areas between these hills and contained a high diversity of species including diverse grass and sedge species typical of wet communities (Homoya et al. 1985). LCHNP was recently purchased by the LaPorte County Park Foundation because of the site's ecological diversity and its potential to be a high quality natural habitat. However, given its location in LaPorte County and its proximity to Red Mill County Park, the preserve is at risk of many disturbances resulting from rapid suburban growth. Disturbances such as deer overcrowding, exotic species invasion, eutrophication, and woody encroachment are noticeable in the preserve and could become more prevalent if a management scheme is not developed and implemented for the ecosystem.

Extensive floristic inventories are valuable because they document the diversity of an ecosystem and reveal species of special concern or interest due to their rarity or unique attributes. Floras have also been valuable in researching ecological theory and applied biology (e.g. plant dispersal, species distributions, municipal planning, weed control, etc.) and recently have shown potential for applications in comparative floristic studies (Palmer & Wade 1995). There are, nevertheless, shortcomings in floristic comparisons and as a result, many authors have noted the importance of including supplemental information to floristic inventories. The usefulness of a flora increases with supplemental components such as site delineation, methodology, and collected specimens (Lawrence 1951; Davis & Heywood 1973; Wilken et al. 1989; Palmer & Wade 1995). A floristic checklist with these additional components becomes even more applicable when it is upheld by community descriptions, statistical analysis, and a basic foundation of ecological information on the abiotic environment. This study attempts to provide a flora with these additional components because a thorough, vouchered floristic checklist has not previously been completed for LCHNP or any known area of similar location and topography.

Species in the soil seed bank should be included in the determination of vegetative diversity (Major & Pyott 1966; Díaz-Villa et al. 2003) because the seed bank not only indicates former environmental conditions, but also implies future evolutionary and ecological trends of an ecosystem (Levin 1990; Aparicio et al. 2002; Díaz-Villa et al. 2003). Due to the large number of groundwater seeps in LCHNP along with an interest in previous community structure and how each community may change with time, an initial seed bank study was conducted to provide insights into past and potential future community structure and composition. Past research leads to the conclusion that wetland ecosystems and their seed bank composition in the northern Midwest have not been studied in detail. Many attempts to describe the seed bank have depended upon germination methods (Roberts 1981; Parker & Leck 1985; Gross 1990). A readily recognized problem of this method is an underestimation of the seed bank due to the specific germination requirements of each species. However, germination is justified as a reasonable technique for identifying the germinable portion of the seed bank (Major & Pyott 1966; Thompson & Grime 1979; Roberts 1981; Parker & Leck 1985; Gross 1990).

Hydrological considerations of wetlands are also important in understanding

these vegetative communities because seasonal variations in hydrological regime (e.g. standing water or no standing water) have been shown to have a major impact on seed germination and the establishment and distribution of wetland species (Champness & Morris 1948; van der Valk 1981; Parker & Leck 1985; Schneider & Sharitz 1986; Leck & Brock 2000).

The major objective of this study is to develop a complete floristic inventory by collecting and identifying all of the vascular plant species present in the preserve and noting any exotic, rare, threatened, or endangered species. In addition, this study examines the distribution of vegetation to indicate what species are dominant in each habitat within the preserve. Comparisons of the wetland communities and their seed banks along with hydrological and chemical analyses provide further insight to the community. This report provides a preliminary description of these habitats and how the sampled seed bank relates to the aboveground vegetation. These insights into LCHNP will provide a comparison study for similar habitats and will also yield a floristic checklist and initial seed bank study for habitat types that have not been previously studied in detail in northern Indiana.

SITE DESCRIPTION

History

In the original 1830 land survey notes for sections 3 and 4, a section line runs directly through the research site. *Fagus grandifolia*, *Acer saccharum*, *Juglans* spp., and *Carya* spp. all ten inches in diameter or greater were present at the site during this time. The area was also reported as being "lame" which most likely referred to poor farming land due to the topography. In later publications, the study site was depicted as a land of ". . . rolling terrain with occasionally rugged bluffs and wide lowlands . . ." that was covered in both mesic forest and wetland species contributing to a great diversity of plants (LaPorte Herald Argus 1933). In later years, area residents described the site as being the locality of "125 springs which are legendarily scattered throughout the grounds" (Michigan City Historical Society 1977).

Gladys Bull Nicewarner recounted the history of Little Calumet Nature Preserve and the closely surrounding areas in a letter written in 1973 (Nicewarner 1973). LaPorte County was originally acquired from the Potawatamie Indians in 1826. The land was of value because it contained some of the finest hardwood forests in the state together with many springs, creeks, and rivers that resulted in a productive area for water-powered saw mills. LCHNP was the site of a timber mill that was in operation from 1833 until the early 1950s. The presence of the mill eventually led to the harvesting of local trees and conversion of the land to agricultural and grazing fields. Around 1876, the mill was additionally used as a feed mill and a cider press which likely contributed to the present establishment of *Malus domestica* in localized areas throughout the preserve. The land ultimately became unusable as a source of timber and the property was sold to the Girl Scouts in 1956. The mill was deconstructed in the 1960s for safety reasons

and the remaining forest was converted into a campground with paths, cabins, shelters, and other structures constructed throughout the property (Nicewarner 1973). In 1999, the property was purchased by the LaPorte County Park Foundation and management of the property was allocated to the LaPorte County Parks Department (Bacone pers. comm.).

Physical Characteristics and Topography

LCHNP is located in northwestern LaPorte County and is adjacent to Red Mill County Park, a recreational area situated on the preserve's western boundary (N 1/2, NW 1/4 of Sec. 3, T36N, R4W; E 1/2, NE 1/4 of Sec. 4, T36N, R4W; SE 1/4, SE 1/4 of Sec. 34, T37N, R4W, LaPorte West and Westville Quadrangles, 510832 E 4605787 N UTM Zone 16 NAD83 Datum). This entire complex, composing 160-acres and containing 23 acres of wetlands and open water, is bordered on the south edge by the Penn Central Railroad, on the north edge by Division Road, and on the eastern side by forested residential properties (Figure 1) (LaPorte County Parks Department 2004). There are two drainage pipes underneath the slope of the railroad that drain agricultural fields located to the south of the property. This water runs directly into a few groundwater seep wetlands and then into the dammed pond. This shallow pond is currently serving as a catchment basin for siltation from hillside and agricultural runoff. This siltation has resulted in terrestrialization of the pond by plants such as *Typha angustifolia*, *Typha latifolia*, *Nuphar advena* and other emergent and aquatic species (Mitsch & Gosselink 2000).

The arrangement of the wooded areas is complex due to the ridge and valley topography of the region and results in microhabitats that tend to support a high diversity of plant species (Stonehouse et al. 2003). On the north side of the pond, the landscape consists of a forested area that gently slopes to the south toward

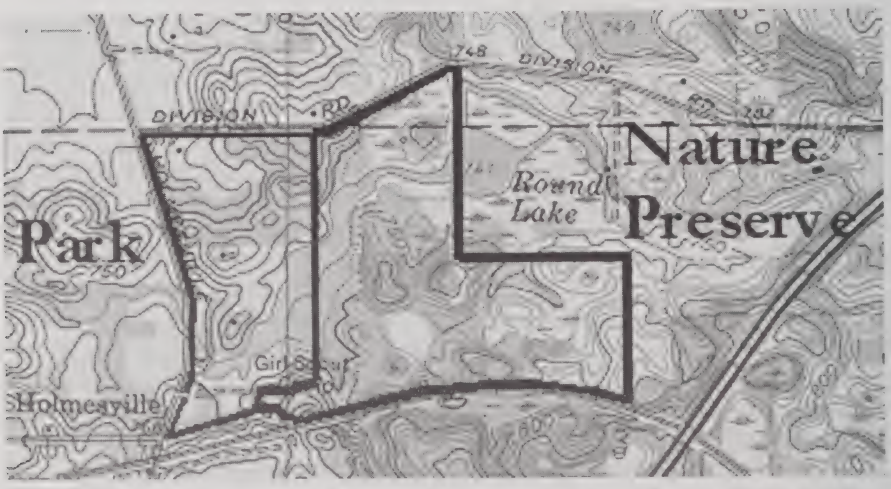

FIGURE 1. Topographic map of Little Calumet Headwaters Nature Preserve and adjacent Red Mill County Park (LaPorte County Parks Department 2004).

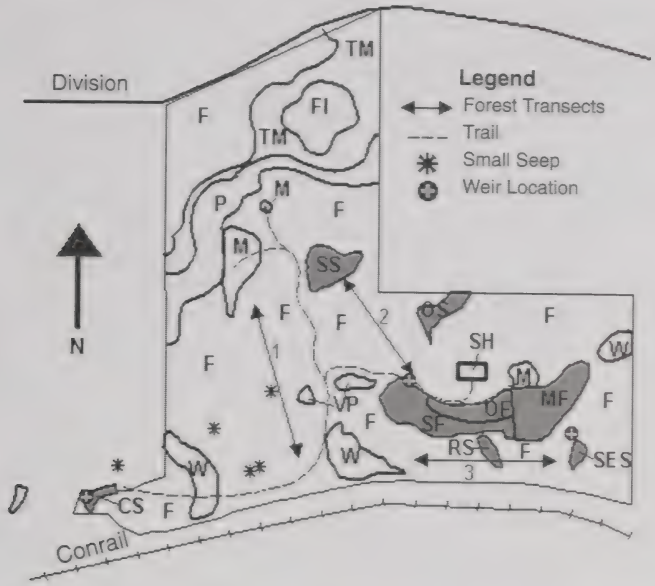

FIGURE 2. Map of Little Calumet Headwaters Nature Preserve, LaPorte County, Indiana (CS = craft seep; F = forested areas; FI = forested island; M = open meadow; MF = marsh fen; OF = open fen; OS = outlet seep; P = pond; RS = railroad seep; SES = SE seep; SF = shrub-carr fen; SH = shelter house; SS = Saxifrage seep; TM = *Typha* spp. floating mat; W = wetland; VP = vernal pool). Forest transects 1, 2, and 3 show the location of the 200-meter forest transects utilized for woody and herbaceous species sampling.

the pond. The terrain to the south of the pond is composed of three forested ridges; one on the west side of the preserve near the pond, a second oriented southeast through the center of the property from the pond to the wetland complex, and a third located parallel to the railroad that runs east and west on the south side of the preserve (Figure 2). Throughout the wooded areas there are remnant buildings, trails, and campsites that were once a part of the Girl Scout Camp (Nicewarner 1973).

Small groundwater wetlands are located throughout the preserve in lowland spots such as valleys and depressions (Figure 2). The springs originate on forested slopes and drain through rivulets, creeks, and wetlands until the water drains into the pond. In one area, water drains out of separate seepage locations on the south ridge slope and forms two groundwater seeps that then drain into a wetland complex where much of the water remains. This, along with additional groundwater seepage within the wetland complex, forms a wet area where many sedges and wetland species thrive (Figure 3). During the study it was seen that the smaller groundwater seeps are seasonally saturated with water, whereas the larger seeps tend to receive less water in the dry months, but still sustain some water flow year round. The wetland complex contains standing water year round, but the volume decreases during the dry months. This wetland complex can be visually divided into three distinct communities: an open fen area with

FIGURE 3. Photograph of a seepage wetland containing *Caltha palustris* at Little Calumet Headwaters Nature Preserve, LaPorte County, Indiana. Photo taken by Dr. Paul Rothrock 2004.

few shrubs, a marsh area dominated by *Carex lasiocarpa* and *Typha latifolia* containing no shrubs, and a shrub-carr portion that is overgrown with shrub species. There are also dry meadows and a few wet meadow areas that are moist year round due to topographic location, but there is no visible water flow through these areas (Figure 2).

Geology and Soils

The Valparaiso Moraine is the terminal position of the Lake Michigan Lobe of the Wisconsin Ice Sheet in which the retreat of glacial ice left behind thick glacial deposits. The eastern portion of the moraine, where the preserve is located, tends to be hilly in comparison to the flat plains of the western portion of the moraine (Hall 1989). Prevalent soil types determined from the LaPorte County Soil Survey include Tracy Sandy Loams, Riddles Loams, Fluvaquents, Histosols, and Aquolls. These soils are underlain by Elsworth Shale bedrock and are dependent on topographic position within the study site. Bottomland and depressional areas make up a large portion of the preserve and are dominated by organic, mucky soils with high water holding capacities (e.g. Histosols, Aquolls, Adrian Mucks, Fluvaquents) (Furr 1982). The plant species present in these areas are characteristic of fen and wetland communities in the Midwest. The upland forested areas are dominated by well-drained loam and sandy loam soils (Tracy Sandy Loams and Riddles Loams) with vegetation typical of a beech-maple habitat (Furr 1982).

METHODS

Floristic Inventory

During the 2004 growing season, monthly and bi-monthly forays were conducted at the study site. In early spring and early summer, plant collection took place two to three times per month, while in late summer and early fall, when the growing season slowed, forays were lessened to one to two times per month. The study site was divided topographically along valleys, ridges, trails, and wetland boundaries to keep track of the areas that had previously been searched for plants. This assured that each section was checked thoroughly and no area went unnoticed. During each outing, care was taken to walk a different route each time in order to cover the entire area and increase the chances of encountering new or rare species in the preserve. Voucher specimens of each species were collected and have been deposited in the Morton Arboretum Herbarium (MOR), Lisle, Illinois. On many occasions, multiple voucher specimens of a particular species were collected when identification of the species was not immediately recognized. Species designations for both scientific and common names followed the USDA plant database which utilizes the most recent nomenclature (Natural Resources Conservation Service 2005). Synonym nomenclature included in the checklist was taken from "Plants of the Chicago Region" which was used for plant identification (Swink & Wilhelm 1994). Species status listings from the Indiana Department of Natural Resources, Division of Nature Preserves were utilized to check for state listed species (Division of Nature Preserves 2004). Species identifications, especially for difficult taxonomic groups, were carefully checked by one of the authors (Dr. Paul Rothrock, Taylor University, Upland, Indiana).

Community Sampling

Woody and herbaceous forest plots were sampled along the same 200 meter transects throughout each of the three wooded areas to the south of the pond (Figure 2). The composition of tree species was sampled with eight 100m^2 circular sampling plots placed every 25 meters. Woody plants with heights greater than 2 meters were considered to be trees. All trees with a diameter of less than 7.6 centimeters (3 inches) were recorded as having a diameter of 6.4 centimeters (2.5 inches). Aerial percent cover of each herbaceous species was measured by sampling every 20 paces along the woody 200 meter transects with a 0.25m^2 rectangular frame.

Twenty herbaceous and ten shrub sample quadrats were sampled with random stratified sampling plots in five groundwater seeps (e.g. craft seep, outlet seep, railroad seep, southeast seep, and Saxifrage seep) and three visually distinct areas located in the wetland complex (e.g. open fen, marsh, and shrub-carr) (Figure 2). Individual grids composed of 5 $\times$ 5 meter square plots were laid out to cover the entire area of each wetland. Sample quadrats within each grid were then chosen using a random number table. Herbaceous and shrub aerial cover was measured randomly in each plot with a 0.25m^2 frame and a 1m^2 frame respectively. In all eight wetlands, ten shrub quadrats were sampled except in the

shrub-carr portion of the wetland complex in which 20 quadrats were sampled due to the high number of shrub individuals. In the marsh area and craft seep no shrub quadrats were sampled because there were no shrubs or very few shrubs present in these communities. Due to resource limitations and time constraints, only a representative portion of the wetland areas were sampled for community structure and plots were not marked for resampling purposes (Figure 2). Open meadows comprised a small portion of the preserve and therefore were not quantitatively sampled (Figure 2). Areas that were not included in the quantitative analysis were surveyed extensively throughout the growing season for the floristic checklist.

Seed Bank Comparison

Five soil samples, approximately 710 cm^3 in volume were taken in April of 2004 in each of the eight wetlands except in the craft seep and the shrub-carr area where ten soil cores were sampled due to the large size of each area. The samples were collected at random distances along the length of a transect spanning across the center of each wetland. An approximate amount of soil in the top 20 centimeters of the profile was sampled with a trowel because root structures inhibited coring a specific volume and depth. Each soil sample was germinated under greenhouse conditions, keeping the soil moist but not waterlogged. Although the limitation of the germination technique has been acknowledged, it is a suitable technique for this preliminary seed bank study because the purpose was to see what species were present and if they differed from the above-ground vegetation. Seedlings were identified and carefully removed from the soil, making sure to extract the entire root mass with minimal loss of soil. Rhizomatous plants were noted and clipped to their base to avoid losing soil volume from pulling extensive root systems. Seedlings that could not be identified were transplanted to separate pots and grown to maturity for identification. When possible, species from the genera *Scirpus* and *Carex* were removed as seedlings and identified according to achene casings.

Hydrology

A preliminary hydrological study was undertaken to understand temporal change of water flow in the preserve area. Temporary V-notched weirs were built for three streams in the preserve, the first located in the southeast corner of the property, the second in the center of the property flowing out of the wetland complex, and the third in the far southwest corner (Figure 2). Water flow was measured in June 2004, August 2004, and April 2005. The weir in the southwest corner of the study site worked only during the first sampling period due to erosion and difficulty inserting the weir. The weir positioned in the stream at the center of the property failed to work during the April 2005 sampling for the same reasons. Depth measurements at the same location in these streams were used to estimate water volume changes. Discharge tables and discharge rate equations were utilized to determine water volume at each site and to estimate the amount of water flowing in the preserve throughout the year (Grant & Dawson 1995).

Soil and Water Chemistry

Bulked soil samples were gathered from seven forested locations all depicting characteristic soil formations from Midwestern forests. Five samples of the top 10 centimeters of soil were collected at each of the seven locations with a trowel and combined for chemical analysis. Each location represented a different ridge or valley within the preserve. Standard chemical parameters of all samples were analyzed by A & L Great Lake Laboratories, Inc. of Fort Wayne, Indiana.

Surface water samples were collected and tested for chemical composition on site in July 2004 and again on April 2005 to check if seasonal variability was present. Reported chemical values are from the July 2004 sampling period because no significant seasonal difference was found between the two sampling periods. Conductivity, pH, and temperature were sampled employing a Eutech/Oakton PC 10 Meter (Eutech Instruments Pte Ltd. 1999). LaMotte Water Pollution Kit 1 was used to determine dissolved oxygen, hardness, and alkalinity (Reen 2001). Each sample was collected from the water surface and stored in a plastic bottle for immediate processing in the field. Only one water chemistry sample was taken at the wetland complex and was assumed to be similar for the three areas within the complex because of the interconnected hydrology of the area through stream networks and localized flow.

Statistical Analysis

There is a realization that a great number of diversity and similarity indices could be applied to this data set, however, due to low numbers of sample plots in each community, the resulting statistical analyses would not be representative of the entire sample area. Furthermore, Squiers and Wistendahl (1977) argue that many indices assume that comparisons between populations occur in sites of the same size, which is not possible unless comparing the same site over a period of time. The calculation of average number of species and average frequency per sample therefore aids in eliminating the problem of comparing areas of different sizes. These two numbers indicate the richness and evenness of a community without utilizing an obscure mathematical equation that is "uninterpretable in terms of the real situation" such as those seen in many diversity indices (Squiers & Wistendahl 1977).

Descriptive statistics were calculated on three forested areas, five groundwater seeps, and three areas of the wetland complex. Calculations included average number of species per plot, importance values, and relative cover and frequency for each species. Woody and herbaceous species were analyzed independently from one another because each life form was sampled separately in the field. Importance values of tree species were determined using relative frequency, relative density, and relative cover. Importance values of herbaceous species were determined using relative cover and relative frequency and considered only if the resulting value was distinctly higher than other species importance values. Relative density was not used in the determination of importance for herbaceous species because herb density was quite low, with only two to three plants per quadrat. The focus of community structure for herbaceous species is relative cover and frequency rather than importance values because of the low number of samples taken and potential inaccuracy of the resulting data. Seed bank data was

given presence and absence values in relation to the data from the above-ground vegetation. From this, percent similarity was calculated to determine if the below-ground seed bank samples correlated strongly with the above-ground vegetation. The percent composition of each species germinated relative to the total number of plants germinated was also determined for the sampled seed bank.

Principal Coordinate Analysis (PCOORDA) was utilized to distinguish vegetation and seed bank differences among the eight chosen wetland areas within the preserve. In prior studies, multivariate ordination analysis has been used to determine site differences among vegetation or seed banks in many habitats (Henderson et al. 1988; Smith et al. 2002; Price & Weltzin 2003; Hölzel & Otte 2004). Relative cover and frequency data were used for the above-ground vegetation analysis and presence and absence data developed the matrix for the seed bank analysis. PCOORDA was applied to the above-ground vegetation data in three combinations: relative cover; frequency; and relative cover and frequency included in the same matrix. Linear transformation and double-centering was conducted on the data set to eliminate the effects of varying scales used during sampling. The Euclidean distance-squared distance measure was then utilized for this analysis. The results from these three trials resulted in extremely similar graphs, so the last of the three trials was chosen for interpretation. The NTSYS-pc software was utilized to conduct the PCOORDA (Exeter Software 1997). After generation of the original PCOORDA, eigenvector distances were reviewed to determine excessive effects of weighting on rare species in the sites. Past research suggests that eigenvector values explain what specific species are having the greatest impact in defining certain axes (Nichols 1977). Through examination of the eigenvector values, it was found that the analysis gave more weight to rare species, therefore species of low cover and frequency were removed from the dataset. Above-ground species that had less than 10% total cover or had less than 5% total frequency were considered rare and removed from the data. For the seed bank data, species with less than five seedlings germinated were also considered rare in the communities and removed from the data set (Gauch 1982; Price & Weltzin 2003). Comparison of the original PCOORDA and the analysis with the removal of rare species showed little difference between the two methods, consequently the original data set was chosen for interpretation. Differences between sites and species with the highest correlations to each axis were determined through eigenvector analysis.

Floristic Quality Assessment (FQA) was applied to the plant inventory list to acquire information on the natural quality of the site as a whole (Wilhelm & Masters 2001). Swink and Wilhelm (1994) suggest four applications for FQA: 1) natural area identification, 2) quality comparisons among sites, 3) long-term monitoring of natural quality, and 4) monitoring community restoration. FQA was used in this study not only to determine the natural quality of the entire preserve, but to also aid in future monitoring efforts after property management or restoration of the preserve (Wilhelm 1977, 1978; Wilhelm & Ladd 1988; Swink & Wilhelm 1994; Rothrock 1997; Taft 1997). The use of FQA for comparisons between sites must be conducted carefully because the analysis is heavily dependent on site size and species diversity. The coefficient of conservatism assigned to each species only reflects the ecological role the species has in the

community without consideration of its distribution or abundance in the community (Swink & Wilhelm 1994; Rothrock & Homoya 2005). Due to this effect, the coefficient of conservatism should be considered when comparing sites of differing size.

RESULTS

Floristic Inventory

The floristic inventory of LCHNP resulted in 298 species of vascular plants representing 188 genera and 84 families (Appendix). The five families with the greatest number of species are the Cyperaceae (39), Asteraceae (29), Poaceae (17), Rosaceae (15), and Ranunculaceae (12). LCHNP has a floristic quality index (FQI) of 70.1 and average mean coefficient of conservatism of 4.1. The high FQI value results from the study site's size and the broad range of habitats rather than an unusually high species quality. An FQI above 45 or a coefficient of conservatism above 4.5 suggests that the area has natural area potential (Swink & Wilhelm 1994). The average mean coefficient of conservatism suggests that LCHNP has some remnant natural quality and deserves a more extensive survey of community structure and species of concern or interest (Swink & Wilhelm 1994). If both FQI and the coefficient of conservatism are considered, LCHNP is a remnant community with natural area potential.

Carex scabrata and *Juncus articulatus* are listed as endangered, *Habenaria hyperborea, Salix eriocephala,* and *Chrysosplenium americanum* are all recorded as threatened and *Diervilla lonicera* and *Eriophorum angustifolium* are cataloged as rare by the Indiana Heritage Program (Division of Nature Preserves 2004) (Figures 4 and 5). No species are listed on the federal endangered, threatened, and rare species list. Species previously noted by Thomas Post, but not located during collection included *Acer rubrum*, *Corylus americana*, *Pedicularis canadensis, Lythrum salicaria,* and *Vaccinium corymbosum.* All of these species are typical of northern Indiana forest communities and were found on a forested island surrounded by the pond on the property which could not be accessed during collection (Figure 2).

Of the 298 species collected, 27 species (9.3%) are exotic, all of which have a very low abundance throughout the preserve. Most of these species are found in meadow and wetland communities (11 species and 7 species respectively); however a few exotics with patchy distribution are present in the wooded areas. These species include *Glechoma hederacea*, *Malus domestica*, *Berberis thunbergii*, and *Rosa multiflora* and do not appear to have severely invaded any wooded habitats. *Vinca minor*, *Morus alba*, and *Elaeagnus angustifolia* are all present on the exterior edges of the preserve and need to be monitored to prevent future invasion. The wetland communities contain a variety of exotic species that are also low in abundance such as *Typha angustifolia* located in both the wetland complex and groundwater seeps. Adventive species exclusive to groundwater seepage areas are *Dipsacus fullonum*, *Ranunculus repens,* and *Rorippa nasturtium-aquaticum*, while *Dianthus armeria*, *Elaeagnus umbellata,* and

FIGURE 4. Photograph of endangered species, *Carex scabrata*, classified by the Indiana Division of Nature Preserves (Division of Nature Preserves 2004). Photo taken by Dr. Paul Rothrock 2004

Mentha spicata are located primarily in the wetland complex. Open dry meadow species include *Trifolium pratense*, *Digitaria ischaemum*, *Phalaris arundinacea*, *Poa compressa*, *Schedonorus phoenix*, *Galium mollugo*, *Daucus carota*, *Hieracium piloselloides*, *Leucanthemum vulgare*, *Cerastium fontanum*, and *Elaeagnus angustifolia. Veronica serpyllifolia*, *Phalaris arundinacea*, *Poa annua*, and *Medicago lupulina* can be found scattered along trails and paths throughout the study site, but as mentioned previously, are not found in high quantities. One plant of *Lythrum salicaria* was also noted in the forested island

FIGURE 5. Photograph of rare species, *Eriophorum angustifolium*, classified by the Indiana Division of Nature Preserves (Division of Nature Preserves 2004). Photo taken by Dr. Paul Rothrock 2004

area on the far north side of the property by Thomas Post, Division of Nature Preserves, but it was not collected.

Biogeographical commentary in floras can serve as a valuable baseline in terms of climate change and the future shift of plant localities. For many species in this study Indiana approximates the northern or southern limit of current distribution (Flora of North America Committee 1993+; Natural Resource Conser-

vation Service 2004). For eight species LaPorte County, in particular, seems very close to the southern edge of their range and for five species it appears to be their northern edge (Table 1). Comparing the current distribution of a species to its distribution in the future can indicate important floristic shifts due to global climate change.

Community Descriptions

Mesic Forest: Wooded communities cover ridge tops, uplands, and slopes of LCHNP (Figure 2). A total of 21 tree species were located in the wooded sample sites, with a density of approximately 1,561 stems per hectare. *Malus domestica* is the only exotic species, while *Pinus resinosa, Pinus sylvestris* and *Pinus strobus* (listed as rare in Indiana) are all considered to have been planted at the site by previous owners and therefore are not included as natural members of the community in the study. Dominant tree species vary among each forest section in the study site, but overall *Liriodendron tulipifera, Prunus serotina,* and *Acer saccharum* are abundant in the overstory (Figure 6). The stems are a mixture of large individuals, such as *Liriodendron tulipifera* and *Prunus serotina* defining the upper canopy and smaller individuals of recent establishment filling the gaps left behind by tree falls. *Acer saccharum* and *Fagus grandifolia* seedlings generally grow into these canopy openings. Individuals that were smaller in stature were greater in number and had higher frequency values than the larger, overstory species with high relative cover but lower frequency values. The presence of *Liriodendron tulipifera, Prunus serotina, Fraxinus americana,* and *Populus deltoides* in the upper canopy most likely resulted from initial or secondary logging of the site. *Ulmus americana* and *Crataegus pruinosa* are both present along forest edges due to shade intolerance and an affinity to disturbance (Burns & Honkala 1990). One individual of *Diervilla lonicera,* a state rare species, is located along a fencerow dividing a path and the railroad tracks. Other shrub species noted in the forested areas are *Lindera benzoin*, *Rosa multiflora*, and *Viburnum acerifolium. Lindera benzoin* is so high in abundance in some areas that it formed thickets, in contrast to the other two species which were only found in the western edge of the woods near the pond.

Spring ephemerals are sparse throughout the forest sites and tend to become denser along the edge slopes of wetland communities. A total of 48 herbaceous species were found in the forested areas with an average of 3.5 species per plot, which suggests a low richness of species in the forest. No exotic or state listed species were found in the forest herbaceous layer. Abundant herbaceous species in the ground layer include *Packera aurea, Podophyllum peltatum, Arisaema triphyllum, Parthenocissus quinquefolia, Galium circaezans,* and *Viola sororia* (RIV = 13.6, 11.9, 9.5, 7.1, 6.4, and 6.0 respectively). Each sample site consists of similar species with varying relative cover values and a few diverging species at lower relative cover percentages (Figure 7). Relative cover suggests species dominance, with the higher relative cover values indicating dominance of a specific species. Frequency values suggest the evenness of species distribution with higher frequencies indicative of even distribution of a species throughout the site. In the overall forest community, *Packera aurea* (20.6), *Podophyllum peltatum* (19.6), *Arisaema triflorum* (11.8), *Galium circaezans* (5.1), and *Partheno-*

TABLE 1. Biogeographical outline of species collected at LCHNP that were found to be in the far northern or southern portions of their continental distributions (Flora of North America Committee 1993+; Natural Resources Conservation Service 2004). Species were considered to be in the northern portion of their range if their distribution was predominantly south of northern Indiana. Alternately, species were considered to be in the far southern portion of their range if the majority of their distribution was located to the north of northern Indiana.

Species Name	Southern Edge of Range	Northern Edge of Range
Carex lasiocarpa	*	
Carex tonsa	*	
Chrysosplenium americanum	*	
Diervilla lonicera	*	
Eriophorum angustifolium	*	
Platanthera huronensis	*	
Juncus articulatus	*	
Liriodendron tulipifera		*
Maianthemum canadense	*	
Panicum rigidulum		*
Sabatia angularis		*
Trillium recurvatum		*
Vernonia gigantea		*

cissus quinquefolia (4.7) have the highest relative cover. These values are considered small and suggest that no species are highly dominant in the community. The evenness of species is also low as indicated by the frequency values (0.15–0.33) (Table 2). Together, these values can be interpreted as the total forest community having a low diversity of species. Table 2 also lists the relative cover and frequency of abundant herbaceous species located in the three separate sampled forest areas. *Packera aurea* is typically found in calcareous wetland

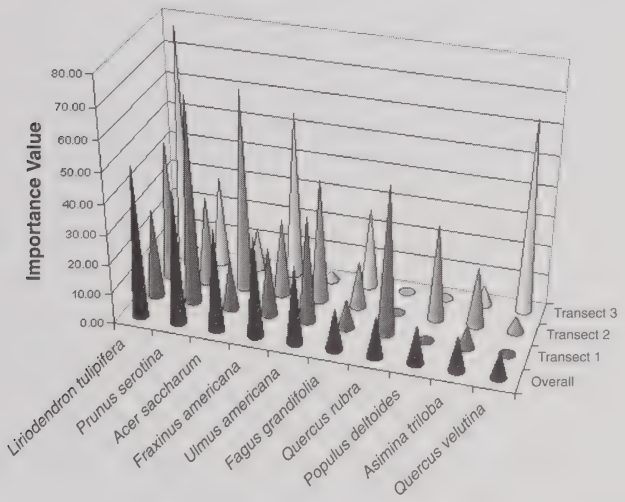

FIGURE 6. Composition of the forest community in Little Calumet Headwaters Nature Preserve. 6. Dominant tree species: the dominant species are those that have an importance value of 20 or higher at one or more sites. See figure 2 for transect locations.

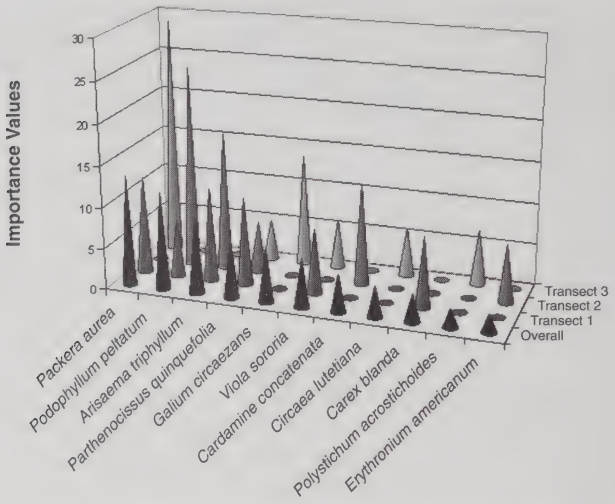

FIGURE 7. Dominant herbaceous species: the dominant species are those with importance values of 5 and above at one or more sites. See figure 2 for transect locations.

habitats and wet meadows (Swink & Wilhelm 1994), however in this site, the species is widely distributed both in wet communities and mesic woodlands. The FQI for woody and herbaceous forest species is 30.3 with a mean C value of 4.4 which suggests that the area is a remnant community with some disturbance but contains enough quality to be considered of marginal natural area potential (Swink & Wilhelm 1994).

Soil analysis from the forest community results in typical values for northwestern Indiana forests of the Valparaiso Moraine region (Furr 1982; Kite pers. comm.) (Table 3). Soil pH ranges from 5.3 to 6.1, which is slightly acidic, but typical for woodlands of this type. Percent organic matter is relatively low (2.0% to 4.9%) because deposition of organic material is low in less mature forest communities. This result could also possibly suggest that decomposition rates in the wooded areas are high. The glacial till left by the Wisconsin glaciation originally came from dolomitic parent material rich in calcium and magnesium. Not surprisingly, then, our soil samples showed high levels of magnesium (65–170 ppm) when compared to the average concentrations across northern Indiana. On the other hand, they had very low to medium concentrations of calcium (250–850 ppm). This may be the result of differential leaching of calcium from the sandy loam soils (Furr 1982). Cation exchange capacity of LCHNP soils ranged from 3.2 to 8.1 meq/100g, a range characteristic for the soil type of this area (Foth 1990). Potassium levels were also moderate and typical of northern Indiana soils. Underlying the glacial till of LCHNP is parent bedrock of Ellsworth shale; it is buried too deeply to affect the chemistry of local soils.

Groundwater Seep Wetlands: Within the wooded habitats are many isolated wetlands originating from groundwater springs along forested slopes (Figure 2).

TABLE 2. Ranked percent relative cover (RC) of the most abundant herbaceous species among three sample sites. All forest sample sites are combined and include frequency estimates for Little Calumet Headwaters Nature Preserve. See figure 4 for the importance values of each species below.

Species	All Forested Areas % RC	Frequency
Packera aurea	20.6	0.23
Podophyllum peltatum	19.6	0.15
Arisaema triphyllum	11.8	0.25
Galium circaezans	5.1	0.27
Parthenocissus quinquefolia	4.7	0.33
Cardamine concatenata	4.5	0.16
Polystichum acrosticoides	3.5	0.05
Viola sororia	3.3	0.30
Carex blanda	2.5	0.15
Circaea lutetiana	2.3	0.18
Erythronium americanum	0.8	0.13

Total # spp. = 48
Average # spp. per plot = 3.5

These seeps differ in size and water flow, but typically are not over 4 hectares in size. Smaller seeps (less than 0.4–0.8 hectares) experience water flow during spring and early summer, but then dry completely during late summer, fall, and winter (Figure 2). Larger seeps, such as the craft seep, sustain water flow throughout the year but the volume of water lessens during the dry season (late summer through winter). Stream systems connecting wetland areas also experience a seasonal change in the volume of water flow throughout the year. Discharge rates decrease slightly into the dry season and increase to normal volume during the growing season. Streams near the shrub-carr area of the wetland complex and southeast seep showed a reduction in flow from early summer to late summer (6.0 gal/min and 5.8 gal/min to 0.7 gal/min and 0.5 gal/min respectively). The craft seep weir measurement was taken one time due to difficulty installing equipment. This measurement, taken on June 15, 2004, resulted in a flow rate of 28.5 gallons per minute. Depth measurements of 7.0 cm and 4.8 cm were taken on August 3, 2004 and April 17, 2005 respectively and are interpreted as a reduction in water discharge rates during the dry season as seen in the other two streams sampled. Water chemistry analysis in the groundwater seeps and wetland complex resulted in typical chemical values for Midwestern wetlands and

TABLE 3. Bulked soil analysis from seven upland forest sites in Little Calumet Headwaters Nature Preserve.

Location	Organic Matter (%)	pH	K (ppm)	Mg (ppm)	Ca++ (ppm)	CEC (meg/100g)
A	2.6	5.8	110	170	800	8.1
B	4.9	5.6	55	165	750	7.7
C	2.5	5.5	96	125	500	6.2
D	3.7	5.7	70	150	750	7.6
E	2.7	5.3	83	65	250	3.2
F	3.1	6.1	73	145	850	6.8
G	2.0	5.9	50	85	65	5.3

TABLE 4. Water chemistry at five sites in Little Calumet Headwaters Nature Preserve, LaPorte County, Indiana sampled on July 18, 2004.

Location	Temp. (°C)	pH	Conductivity (µS)	Alkalinity (mg/l)	Dissolved Oxygen (mg/l)	Hardness (mg/l)
Fen	21.4	7.4	750	390	5.2	400
Craft Seep	14.7	8.1	840	N/A	7.5	320
SE Seep	19.0	8.2	826	370	6.6	360
Outlet Seep	18.6	7.9	628	273	2.2	332
Pond	25.7	7.7	608	232	9.6	225

do not have a significant seasonal variation in values (Table 4) (Stewart et. al. 1993; Amon et. al. 2002). Conductivity and alkalinity for the wetland areas range from 608–826 µS and 232–390 mg/l respectively. Dissolved oxygen levels range from 2.2–7.5 mg/l, which is typical when compared to past studies in Indiana fen habitats that resulted in a mean of 7.3 mg/l (Stewart et. al. 1993). pH and hardness values were also typical of wetlands in the area with pH ranging from 7.4 to 8.2 and hardness 225–400 mg/l.

The five groundwater seeps consist of many similar species, but also have a slight variation in species composition (Table 5). 49 total herbaceous species were recorded with an average of 4.6 species per sample plot indicating moderate species richness. *Symplocarpus foetidus* (33.3%), *Carex bromoides* (7.9%), *Caltha palustris* (7.8%), *Impatiens capensis* (7.5%), and *Leersia oryzoides* (3.9%) have the highest percent relative cover out of five seep areas sampled. All of these species are uneven in distribution (frequency = 0.16–0.37) except *Symplocarpus foetidus* that has a moderately even distribution (frequency = 0.65). *Symplocarpus foetidus* is by far the most dominant species in all five groundwater seepage areas according to relative cover estimates and has a relative importance value of 23.6 (the next highest RIV is *Impatiens capensis* at 7.7). *Caltha palustris* is present in abundance at all groundwater seeps sampled except the outlet seep and therefore shows large cover values for the total seepage habitats. The overall relative cover for *Carex bromoides* can be attributed to its high relative cover value in the SE seep, which is the only seep that contains this species in abundance. *Impatiens capensis* and *Leersia oryzoides* are present in only two of the five seepage wetlands, but are in such high abundance in those communities that their overall relative cover for all seeps is also high.

The shrub species for all five groundwater seeps are low to medium in richness and evenness. Shrub cover in the four groundwater seeps (the craft seep is not included due to virtually no presence of shrub species) is dominated by *Lindera benzoin* (33.7%), *Cornus racemosa* (17.7%), and *Cornus sericea* (15.3%) all with a frequency of less than 0.50 (Table 6). A total of 15 shrub species are located in these groundwater seeps with an average of 1.4 species per plot. Individual seepage wetlands are dominated by one of these three species and the most abundant shrub has a relatively high frequency and therefore it is evenly distributed (Table 6). The few shrubs that are present in the craft seep are *Cornus* spp. The FQI value of these seeps is 31.6 with a mean C of 4.1, indicating

TABLE 5. Ranked percent relative cover (RC) and corresponding frequency values of the five dominant herbaceous species for five groundwater seeps individually and combined at Little Calumet Headwaters Nature Preserve.

All Seeps			Craft Seep		
Species	% RC	Frequency	Species	% RC	Frequency
Symplocarpus foetidus	33.3	0.65	*Symplocarpus foetidus*	32.0	0.45
Carex bromoides	7.9	0.16	*Impatiens capensis*	14.1	0.55
Caltha palustris	7.8	0.33	*Caltha palustris*	13.7	0.15
Impatiens capensis	7.5	0.37	*Cardamine pensylvanica*	3.4	0.50
Leersia oryzoides	3.9	0.22	*Symphyotrichum puniceum*	5.2	0.25
Total # spp. = 49			Total # spp. = 18		
Average # spp. per plot = 4.6			Average # spp. per plot = 3.8		

Outlet Seep			Railroad Seep		
Species	% RC	Frequency	Species	% RC	Frequency
Symplocarpus foetidus	13.9	0.45	*Symplocarpus foetidus*	45.5	0.75
Leersia oryzoides	11.9	0.55	*Caltha paulstris*	6.1	0.25
Carex stipata	11.7	0.20	*Pilea fontana*	6.1	0.45
Ranunculus hispidus	7.9	0.40	*Equisetum arvense*	5.5	0.45
Amphicarpaea bracteata	6.9	0.30	*Galium aparine*	5.2	0.40
Total # spp. = 21			Total # spp. = 21		
Average # spp. per plot = 4.5			Average # spp. per plot = 4.6		

Saxifrage Seep			SE Seep		
Species	% RC	Frequency	Species	% RC	Frequency
Symplocarpus foetidus	43.3	0.80	*Symplocarpus foetidus*	27.4	0.80
Saxifraga pensylvanica	14.0	0.50	*Carex bromoides*	25.7	0.45
Impatiens capensis	9.3	0.50	*Eupatorium maculatum*	8.8	0.35
Laportea canadensis	7.3	0.30	*Leersia oryzoides*	8.4	0.35
Leersia oryzoides	5.3	0.40	*Caltha palustris*	5.9	0.50
Total # spp. = 22			Total # spp. = 21		
Average # spp. per plot = 4.9			Average # spp. per plot = 5.2		

that the seeps have experienced minimal disturbance and have the potential to be quality remnant natural areas (Swink & Wilhelm 1994).

Wetland Complex: The wetland complex located in the center of the study site is interesting because it is composed of three visually distinct areas: a marsh area; an open fen area; and a shrub-carr area (Figure 2). Each area has species common to the others, but may have different dominant species or contain species unique to that site. The total number of species in the wetland complex is 44 with an average of 5.1 species per plot suggesting moderate species richness. The five most dominant species for the overall wetland complex are *Carex lasiocarpa* (16.3%), *Leersia oryzoides* (12.1%), *Symplocarpus foetidus* (11.2%), *Carex stricta* (6.8%), and *Impatiens capensis* (6.0%) (Table 7). Frequency, also indicative of species evenness, ranges from 0.23 to 0.38 (Table 7). The most dominant species, *Carex lasiocarpa*, is only present in the marsh area, but has such a high cover (51.4%) and frequency (0.95) that it is on average considered the most

TABLE 6. Ranked percent relative cover (RC) and corresponding frequency values of dominant shrub species for five groundwater seeps individually and combined at Little Calumet Headwaters Nature Preserve. The craft seep had low shrub abundance throughout the site and therefore was not sampled.

	All Seeps		Outlet Seep		Railroad Seep		Saxifrage Seep		SE Seep	
Species	% RC	Freq	% RC	Freq	% RC	Freq	% RC	Freq	% RC	Freq.
Lindera benzoin	33.7	0.45	63.5	0.90	4.7	0.10	39.5	0.50	21.3	0.30
Cornus racemosa	17.7	0.23			81.2	0.70			17.3	0.20
Cornus sericea	15.3	0.20	23.3	0.20			40.5	0.50	4.0	0.10
Salix nigra	4.9	0.05							18.2	0.20
Zanthoxylum americanum	4.1	0.08	12.8	0.30						
Fagus grandifolia	3.4	0.05			14.1	0.20				
Cornus alternifolia	3.0	0.05							10.7	0.20
Total # spp.	15		4		3		4		11	
Average # spp. per plot	1.4		1.5		1.0		1.4		1.7	

dominant species of the entire complex. *Leersia oryzoides* is also only present in one of the three areas (open fen) and ranked second most dominant species for the same reasons (RC = 29.9% and frequency = 0.60). *Symplocarpus foetidus*, *Carex stricta*, and *Impatiens capensis* are all present in two of the three wetland communities and have low to moderate relative cover and frequency values (Table 7). These three wetland species can be considered as the most dominant species of the entire wetland complex because both *Carex lasiocarpa* and *Leersia oryzoides* are not present in the majority of the wetland complex study area.

The overall wetland complex consists of 18 shrub species averaging 1.7 species per square-meter plot. This indicates moderate species richness in the woody shrub strata. Dominant shrub species, based upon percent relative cover values, include *Salix nigra* (16.1%), *Cornus alternifolia* (12.8%), *Toxicodendron vernix* (9.6%), *Lindera benzoin* (9.3%), *Salix discolor* (8.6%), *Asimina triloba* (8.0%), and *Cornus sericea* (7.3%) (Table 8). These shrub species all have very low frequency values (0.07–0.23) due to their patchy distribution throughout the wetland and concentration of cover in the shrub-carr portion of the complex. The high relative cover percentages of *Cornus alterniflora*, *Toxicodendron vernix*, *Lindera benzoin*, and *Asimina triloba* result from their presence in only one of the sites in which the abundance of each species is relatively greater than the other shrub species in the area. *Salix nigra*, *Salix discolor*, and *Cornus sericea* are located in both the open fen and shrub-carr portions of the wetland complex and have moderate to high abundance (Table 8). Note that the marsh area is not included in the shrub analysis because there were no shrubs present at that location. The FQI value of the three wetland areas combined is 31.7 with a mean C of 4.2 suggesting that the area has remnant natural area potential, but has undergone some disturbance in the past (Swink & Wilhelm 1994).

Seed Bank Analysis: 46 species (1, 835 seedlings total) were germinated out of the collected seed bank samples representing 22 families and 33 genera. Percent

TABLE 7. Ranked percent relative cover (RC) and corresponding frequency values of the five dominant herbaceous species for three fen areas individually and combined at Little Calumet Headwaters Nature Preserve.

All Fen Areas			Open Fen		
Species	% RC	Frequency	Species	% RC	Frequency
Carex lasiocarpa	16.3	0.33	*Leersia oryzoides*	29.9	0.60
Leersia oryzoides	12.1	0.28	*Symplocarpus foetidus*	13.9	0.55
Symplocarpus foetidus	11.2	0.38	*Carex stricta*	8.6	0.20
Carex stricta	6.8	0.23	*Agrimonia parviflora*	7.7	0.45
Impatiens capensis	6.0	0.38	*Equisetum arvense*	5.6	0.45
Total # spp. = 44			Total # spp. = 30		
Average # spp. per plot = 5.1			Average # spp. per plot = 5.6		

Shrub-carr			Marsh		
Species	% RC	Frequency	Species	% RC	Frequency
Symplocarpus foetidus	17.7	0.55	*Carex lasiocarpa*	51.4	0.95
Carex stricta	11.0	0.50	*Typha latifolia*	9.8	0.50
Impatiens capensis	10.6	0.50	*Thelypteris palustris*	8.0	0.40
Equisetum arvense	10.0	0.55	*Impatiens capensis*	6.7	0.45
Symphyotrichum puniceum	5.9	0.40	*Sagittaria latifolia*	3.8	0.30
Total # spp. = 29			Total # spp. = 19		
Average # spp. per plot = 6.0			Average # spp. per plot = 3.9		

similarity between the sampled seed bank and above-ground vegetation is 71.7% with 33 of the 46 species present in both above and below ground populations. Eight species composed greater than 5% of the total number of plants germinated (i.e. greater than 100 seedlings germinated) in the seed bank samples all of which were present in the above-ground vegetation. These species include *Carex hystericina* (15.4%), *Juncus effusus* (15.2%), and *Glyceria striata* (13.7%) and all have less than 1% relative cover in the above-ground vegetation (Figure 8). Species germinated from seed bank samples but not present in the above-ground vegetation determined from the floristic inventory, all had a percent composition of less than 2.0% (Figure 9). Species in the germinated seed bank samples are typical for each wetland community, with many species being pioneer or early successional species and therefore absent from the above-ground vegetation. Species not present in the seed bank samples, but abundant in the above-ground vegetation tend to reproduce through other means (i.e. vegetatively). No exotic species or state listed species were germinated from the sampled soil.

Principal Coordinate Analysis (PCOORDA): Principal Coordinate Analysis (PCOORDA) for the above-ground vegetation sample plots revealed distinct differences in the structure and composition of the wetland complex areas versus groundwater seeps (Figure 10). A two-axis PCOORDA was utilized to analyze the differences between sites, with axis one accounting for 20.7 percent and axis two explaining 19.1 percent of the total variation for the wetland above-ground vegetation. Species identified by the analysis as being particularly important in accounting for the separation among sites include *Agrimonia parviflora*, *Carex*

TABLE 8. Ranked percent relative cover (RC) and corresponding frequency values of dominant shrub species for three fen areas individually and combined at Little Calumet Headwaters Nature Preserve. The marsh area has a low abundance of shrub species throughout the site and therefore was not sampled.

	All Fen Areas		Open Fen		Shrub-carr	
Species	% RC	Frequency	% RC	Frequency	% RC	Frequency
Salix nigra	16.1	0.17	14.8	0.20	16.7	0.15
Cornus alternifolia	12.8	0.17			19.1	0.25
Toxicodendron vernix	9.6	0.17			14.3	0.25
Lindera benzoin	9.3	0.07	28.5	0.20		
Salix discolor	8.6	0.13	1.6	0.10	11.9	0.15
Asimina triloba	8.0	0.17			11.9	0.25
Cornus sericea	7.3	0.23	18.0	0.30	2.1	0.20
Cornus florida	5.9	0.10	18.0	0.30		
Cornus racemosa	4.8	0.07			7.2	0.10
Carpinus caroliniana	3.7	0.05			5.6	0.05
Salix eriocephala	3.7	0.10	3.3	0.10	3.7	0.10
Total # spp.	18		9		13	
Average # spp. per plot	1.7		1.6		1.7	

bromoides, and *C. lasiocarpa*. The marsh area of the wetland dominated by *Typha latifolia* and *C. lasiocarpa* is more similar vegetatively to the groundwater seep wetlands than to the other two portions of the wetland complex. This is both due to the dominance of a few species that are also found in the groundwater seep wetlands and the lower diversity of the site compared to the remaining wetland complex. This analysis also indicates that although the groundwater seeps have a slight variation in above-ground species composition, all five areas are vegetatively similar to one another. The three portions of the wetland complex

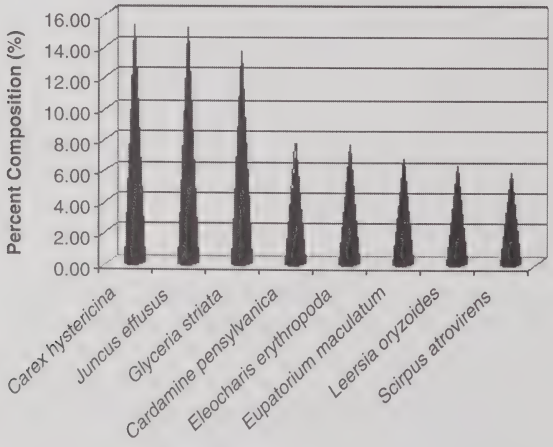

FIGURE 8. Percent composition of the eight most abundant species in Little Calumet Headwater Nature Preserve germinated from the seed bank.

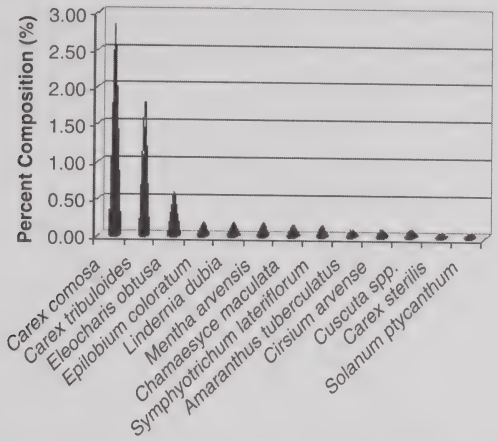

FIGURE 9. Percent composition of germinated seed bank species in Little Calumet Headwaters Nature Preserve that are absent from the above-ground vegetation.

sampled are distinct from one another and the open fen and shrub-carr portions are significantly different from the five groundwater seeps. This suggests that the three visually distinct wetland areas mentioned previously in this paper are, in fact, different in composition and structure in the above-ground vegetation according to the samples collected (Figure 2). The shrub-carr and open fen areas are shown to be extremely different in vegetative composition due to the presence of a few key species that are abundant in the wetland complex communities and absent or very uncommon in other wetland habitats (Figure 10). These species include, but are not limited to: *Carex stricta, Typha angustifolia, Lycopus americanus, Salix eriocephala, Eupatorium maculatum*, and *Salix discolor.* These wetland communities (except the marsh area) are distinctly different in composition and structure than the five groundwater seeps that are similar in above-ground vegetation to one another (Figure 10). Removal of rare species from PCOORDA analysis resulted in no change in the ordination of wetland complex and seep communities. Omission of shrub cover also did not greatly alter the results of the original PCOORDA analysis, which suggests that woody vegetation does not have a significant impact on the differences or similarities between the wetland areas.

PCOORDA comparing the sampled seed bank among the eight wetland communities resulted in a separation of the wetland complex areas and groundwater seeps (Figure 11). This two-dimensional PCOORDA analyzed the differences between the seed bank of each site, with axis one accounting for 25.9 percent and axis two explaining 18.3 percent of the total variation. *Eupatorium maculatum*, *Leersia oryzoides*, and *Pilea pumila* were recognized by the analysis as being particularly influential in the separation between sites. The open fen, marsh, and shrub-carr areas of the wetland complex show high similarity in terms of seed bank composition. The SE seep and railroad seep wetlands are also similar in seed bank composition, but are markedly different from the seed bank

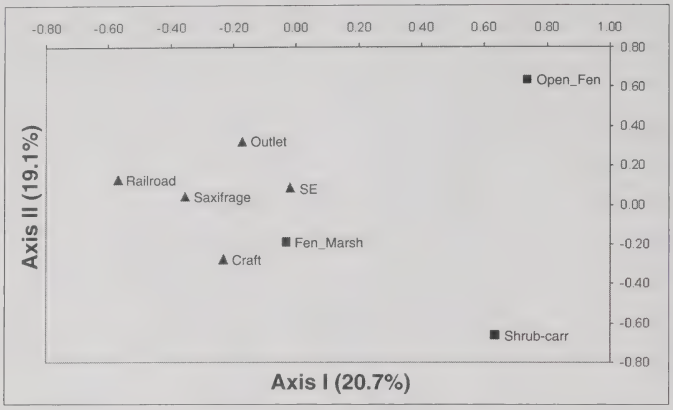

FIGURE 10. PCOORDA showing the differences in above-ground vegetation among eight wetland sites using relative cover and frequency at Little Calumet Headwaters Nature Preserve. Numbers in parentheses next to each axis represent the percent total variation explained by each axis.

samples from the craft seep, Saxifrage seep, and outlet seep wetlands. The sampled seed bank variation in the craft seep is due to the presence of rare species not found in the other seed bank areas sampled. These rare species are *Apocynum sibiricum*, *Cuscuta* spp., *Carex sterilis, Penthorum sedoides, Ranunculus hispidus,* and *Symphyotrichum lateriflorum*. The Saxifrage seep and the outlet seep varied slightly in seed bank composition due to the presence of *Persicaria hydropiperoides*, a rare species not found in the other wetland areas and also because they were lacking *Carex comosa* which is abundant in the other wetland seed bank samples. The differences among the groundwater seep seed bank samples that were similar in the composition and structure of above-ground species (Figures 10 and 11) are due to varying early successional species in each seep. After initial invasion by pioneer species, which depend on site size, germination cues, and chance seeding of the area, all of the groundwater seeps became dominated by species that either do not depend fully on seed reproduction or utilize another form of reproduction entirely (Leck et al. 1989; Leck & Brock 2000). Removal of rare species from the PCOORDA analysis did not greatly affect the results, except in the craft seep, which was clustered with the railroad seep and SE seep after exclusion of rare species. This change suggests that the craft seep seed bank samples have a high proportion of species with low numbers of seedlings germinated (less than five seedlings), which has caused the seep to be significantly different from the other groundwater seeps.

DISCUSSION

LCHNP has a diverse flora due to the variety of plant communities within the preserve, none of which have been documented in previous research. This study has documented 298 species of which 270 are native to Indiana. Historical de-

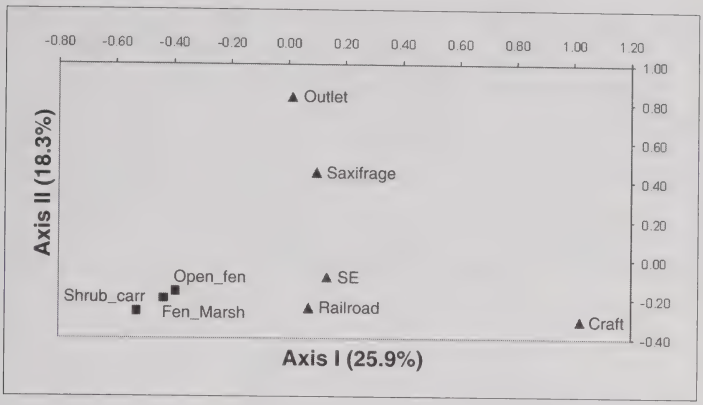

FIGURE 11. PCOORDA of variation in germinated seed bank samples among eight wetland areas utilizing presence and absence data at Little Calumet Headwaters Nature Preserve. Numbers in parentheses next to each axis represent the percent total variation explained by each axis.

scriptions of the forested areas and wetland communities correspond to the present structure and composition of the study site. The original surveyor's notes from 1830 describe the area as having *Fagus grandifolia*, *Acer saccharum*, *Carya* spp., and *Juglans* spp. all of which were found at the site in this study except *Juglans* spp. A more precise historical description of LCHNP was made by Thomas Post (1997) where all of the tree species mentioned as being historically present have been located in this research project. Homoya et al. (1985) noted the historical presence of many sedge and grass species due to the topography of the area producing low areas conducive to the formation of spring seeps and fens. The Michigan City Historical Society (1977) noted the presence of "125 springs . . . scattered throughout the grounds" however, an estimate of the number of springs encountered in this study is not that high. Further hydrological studies would give a more accurate approximation as to how many springs are in the preserve and the specific discharge rates throughout each wetland habitat.

This research provides baseline data of native and exotic species composition and community structure at LCHNP that can serve as a guide to monitor changes resulting from management implementations. The low percentage of exotic species found in this study, compared to other sites in northern Indiana, is puzzling. One possible cause is that the preserve is of larger size than many and has a noteworthy diversity of native species due to its varied topography and broad range of habitats. Another contributing factor may simply be that the preserve boundary was delineated in a manner that included the portions of the property with the highest natural quality and excluded areas with a predominance of disturbance habitat. Other floristic studies from sites of varying sizes in the region found higher percentages of exotics including Fall Creek Gorge (16.8%), Fogwell Forest (11.5%), Botany Glen (17.4%), and Neithercut Woodland (17.5%) (Tonkovich & Sargent 1997; Rothrock 1997; Stonehouse et al. 2003; Williams et al. 2005). Barker Woods Nature Preserve of LaPorte County, Indiana and Ben-

dix Woods in St. Joseph County, Indiana had a lower abundance of exotics with 8.2 and 5.0 percent respectively (Blodgett & Riemenschneider 1982; Reed 1985). Species richness of LCHNP was similar to a forested site of similar size such as Fall Creek Gorge (149 acres), which contained 346 species (Tonkovich et al. 1997). If the minor size difference between these two sites is considered, the species richness is similar for both areas. Since plant collection was only conducted during one growing season and because this was the first recorded collection at this site, species (especially rare or infrequent) may have been overlooked. Additional collections are recommended in order to obtain a more complete floristic survey of the preserve. Long-term monitoring of LCHNP would also give insight as to how to manage a property consisting of varying habitat types that is affected by urban growth. This study can also serve as a comparison flora for similar communities in northern Indiana.

Management of LCHNP is critical to sustain the diversity and natural quality of the ecosystem because of the major effects of urbanization in the area. The maintenance and preservation of original communities becomes more challenging with the fragmentation of these communities from agricultural and urban development (Ruch et al. 1998). Urbanization of the area surrounding LCHNP is having major effects on the natural quality of the preserve. Deer over browsing is a significant problem at LCHNP and may have resulted in thinning the forest ground layer herbaceous species (e.g. *Dicentra cucullaria* is completely absent at the preserve). High deer populations may have also caused the spreading and invasion of *Lindera benzoin* throughout the forested and wetland communities as a result of this herbaceous thinning. Selective cutting of this shrub species followed by herbicide application is the best management solution for this problem. Prescribed burning should not be implemented in the forested areas to decrease *Lindera benzoin* and increase herbaceous diversity because species such as *Liriodendron tulipifera* are sensitive to fire and would not recover (Reber pers. comm.).

Exotic species are not of major concern in the preserve because they have not invaded any areas, but they should be monitored to prevent future invasion. Exotic species removal would be relatively easy and cost effective at LCHNP because exotics are low in numbers and most are limited to growth in meadow and wetland areas. Proactive removal of these species will prevent expensive restoration and management of this inevitable problem in the future.

The wetland complex is beginning to become overgrown with shrubs from woody encroachment potentially due to the suppression of natural disturbance such as fire. Selective cutting of the shrub species followed by stem herbicide applications would prevent regrowth of shrub cover and would allow herbaceous species to grow. This removal of woody species then could then be followed by an introduced fire regime that follows the frequent pattern of the original natural fire regimes of the area. The marsh area is in need of management due to the low diversity and the dominance of a few plant species. Wicking of the cattail would allow growth of native species by removing the canopy and allow them to take over and thrive. The initial seed bank study revealed that utilization of the seed bank store for management or restoration purposes may not improve the overall quality of the wetland communities because the seed bank contains most of the same species currently present in the above ground vegetation. However, germi-

nation studies may not sample densely enough to reveal rare species in the seed bank that may have more specific germination requirements than more commonly found species. Further examination of the seed bank is recommended in future studies in order to fully understand the usefulness of the existing seed bank for management of the area. The pond is also in need of management because it is filling in and becoming dominated by *Typha* spp. Further research on the rate of sediment loading and *Typha* spp. encroachment is needed to fully understand what steps should be taken to manage this area properly. Careful consideration and thorough research should be performed to determine the best solution for restoring this area to its natural condition.

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APPENDIX

Catalog of Vascular Plants of Little Calumet Nature Preserve
(arranged by major taxonomic group, then alphabetically by family)

Following each species is information specific to its occurrence in Little Calumet Headwaters Nature Preserve. The symbols in parentheses immediately following each common name refer to the following: E = state endangered; T = state threatened; R = state rare; * = exotic, adventive, non-indigenous, or non-native species. A coefficient of conservatism is also assigned to each native species (Rothrock 2004). Exotic or non-native species are given a coefficient of null value. C-Values: 1–3 = species widespread under many disturbance conditions; 4–7 = species show a distinct affinity to a natural community; 8–10 = species that signify stable, high-quality natural communities (Wilhelm 1988).

Frequency estimates: rare = 1–3 colonies although species may be abundant at one site; infre-

quent = occasional, not widespread, may be abundant at one site; frequent = common in suitable habitat, may be locally abundant in a few sites; abundant = in vast numbers throughout the property, not localized to a few sites (Stonehouse et al. 2003).

The characteristic habitat and collection numbers are listed following the estimate of abundance. Voucher specimens are deposited in the Morton Arboretum Herbarium (MOR) with duplicate vouchers placed in the Butler University Herbarium (BUT). Nomenclature follows the Floristic Quality Assessment Catalog of Plants for Indiana Flora by Kay Yatskievych, which utilizes the most recent nomenclature from the USDA plant database (Rothrock 2004 & Natural Resources Conservation Service 2004). Scientific names located in parentheses follow the nomenclature of Plants of the Chicago Region (Swink & Wilhelm 1994).

PTERIDOPHYTES

LYCOPODIACEAE (Club Moss Family)

Lycopodium digitatum Dill. ex A. Braun (=*Lycopodium complanatum* L. var. *flabelliforme* Fern.): Fan Clubmoss; (C = 2); frequent; mesic woods; JLA 363.

EQUISETACEAE (Horsetail Family)

Equisetum arvense L.: Field Horsetail; (C = 1); abundant; shaded mesic woods and near seepage wetlands and creeks; JLA 31.

Equisetum fluviatile L.: Water Horsetail; (C =10); infrequent; mesic woods; PER 4206.

DENNSTAEDTIACEAE (Bracken Fern Family)

Pteridium aquilinum (L.) Kuhn var. *latiusculum* (Desv.) Underw.: Western Bracken Fern; (C = 5); infrequent; along trail; JLA 88.

DRYOPTERIDACEAE (Wood Fern Family)

Athyrium filix-femina (L.) Roth var. *angustum* (Willd.) Lawson (= *Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.): Subarctic Ladyfern; (C = 6); frequent; mesic woods; JLA 360.

Deparia acrostichoides (Sw.) M. Kato (=*Athyrium thelypteroides* (Michx.) Desv.): Silver False Spleenwort; (C = 8); rare; mesic woods; PER 4237.

Dryopteris carthusiana (Vill.) H.P. Fuchs (=*Dryopteris spinulosa* (O. F. Müll.) Watt): Spinulose Wood Fern; (C = 6); infrequent; seepage wetland; PER 4235.

Onoclea sensibilis L.: Sensitive Fern; (C = 4); frequent; shaded seepage wetlands; JLA 41.

Polystichum acrostichoides (Michx.) Schott.: Christmas Fern; (C = 5); infrequent; mesic woods along trail; JLA 147.

THELYPTERIDACEAE (Thelypteris Family)

Thelypteris noveboracensis (L.) Nieuw. (= *Dryopteris noveboracensis* (L.) A. Gray): New York Fern; (C = 10); rare; slope south of open fen; PER 4236.

Thelypteris palustris var. *pubescens* Schott.: Eastern Marsh Fern; (C = 7); infrequent; marsh fen; JLA 454.

GYMNOSPERMS

CUPRESSACEAE (Cypress Family)

Juniperus virginiana L.: Eastern Redcedar; (C = 2); rare; mesic woods; JLA 457.

PINACEAE (Pine Family)

Pinus resinosa Soland.: Red Pine; (likely planted, C = NA); infrequent; mesic woods; JLA 455.

Pinus sylvestris L.: Scotch Pine; (likely planted, C = NA); infrequent; mesic woods; JLA 385.

Pinus strobus L.: Eastern White Pine; (likely planted, C = NA); one plant in mesic woods; JLA 36.

ANGIOSPERMS

ACERACEAE (Maple Family)

Acer saccharum Marshall: Sugar Maple; (C = 5); abundant; mesic woods; JLA 252.

ALISMATACEAE (Water Plantain Family)

Alisma subcordatum Raf.: American Water Plantain; (C = 2); infrequent; open wet meadow; PER 4226.

Sagittaria latifolia Willd.: Broadleaf Arrowhead; (C = 3); frequent; open fen; JLA 332.

ANACARDIACEAE (Cashew Family)

Rhus typhina L.: Staghorn Sumac; (C = 2); infrequent; edge of woods by seepage wetland; JLA 193.

Toxicodendron radicans (L.) Kuntze: Eastern Poison Ivy; (C = 1); infrequent; mesic woods along trail; JLA 456.

Toxicodendron vernix (L.) Kuntze (= *Rhus vernix* L.): Poison Sumac; (C = 10); infrequent; shrub-carr fen; JLA 247.

ANNONACEAE (Custard Apple Family)

Asimina triloba (L.) Dunal: Papaw; (C = 6); frequent; mesic woods; JLA 126.

APIACEAE (Carrot Family)

Angelica atropurpurea L.: Purplestem Angelica; (C = 6); infrequent; south side of seepage wetland; JLA 139.

Cicuta bulbifera L.: Bulblet-Bearing Water Hemlock; (C = 8); rare; seepage wetland; PER 4215.

Cicuta maculata L.: Spotted Water Hemlock; (C = 6); infrequent; open fen; JLA 333.

Cryptotaenia canadensis (L.) DC.: Canadian Honewort; (C = 3); infrequent; edge of seepage wetland; JLA 194.

Daucus carota L.: Queen Anne's Lace; (*); frequent; open meadow; JLA 328.

Osmorhiza claytonii (Michx.) C.B. Clarke: Clayton's Sweetroot; (C = 3); infrequent; mesic woods; JLA 146.

Osmorhiza longistylis (Torr.) DC.: Longstyle Sweetroot; (C = 3); rare; edge of wooded trail; JLA 107.

Sium suave Walt.: Hemlock Waterparsnip; (C = 5); infrequent; seepage wetland; PER 4234.

APOCYNACEAE (Dogbane Family)

Apocynum cannabinum L.: Indian Hemp; (C = 2); rare; open meadow; JLA 390.

Vinca minor L.: Common Periwinkle; (*); rare; road edge near Preserve boundary; JLA 254.

ARACEAE (Arum Family)

Arisaema triphyllum (L.) Schott.: Jack-In-The-Pulpit; (C = 4); frequent; mesic forest; JLA 25.

Symplocarpus foetidus (L.) Salisb. ex Nutt.: Skunk Cabbage; (C = 8); abundant; seepage wetlands and moist areas; JLA 2.

ARISTOLOCHIACEAE (Birthwort Family)

Asarum canadense L.: Canadian Wild Ginger; (C = 5); frequent; mesic forest; JLA 45.

ASCLEPIADACEAE (Milkweed Family)

Asclepias incarnata L.: Swamp Milkweed; (C = 4); infrequent; open wet meadow; JLA 289.

Asclepias syriaca L.: Common Milkweed; (C = 1); infrequent; open meadow; JLA 389.

ASTERACEAE (Aster Family)

Achillea millefolium L.: Common Yarrow; (C = 0); abundant; trail edges, open meadow; JLA 235.

Ageratina altissima (L.) King & H.E. Robins. var. *altissima* (=*Eupatorium rugosum* Houtt.): White Snakeroot; (C = 2); infrequent; mesic woods; JLA 373.

Antennaria plantaginifolia (L.) Richards.: Woman's Tobacco; (C = 3); infrequent; open meadow; JLA 55.

Bidens cernua L.: Nodding Beggartick; (C = 2); infrequent; seepage wetland; PER 4214.

Bidens tripartita L.: Threelobe Beggarticks; (C = 2); infrequent; open fen; JLA 412.

Bidens coronata (L.) Britton: Crowned Beggarticks; (C = 5); infrequent; seepage wetland; PER 4216.

Bidens frondosa L.: Devil's Beggarticks; (C = 1); rare; open wet meadow; PER 4211.

Cirsium muticum Michx.: Swamp Thistle; (C = 8); frequent; open wet meadow; PER 4209.

Erechtites hieraciifolia (L.) Raf.: American Burnweed; (C = 2); infrequent; open meadow; PER 4223.

Erigeron philadelphicus L.: Philadelphia Fleabane; (C = 3); frequent; open meadow; JLA 106.

Eupatoriadelphus maculatus (L.) King & H.E. Robins. (=*Eupatorium maculatum* L.): Spotted Trumpetweed; (C = 5); frequent; open fen and wet meadow; JLA 336.

Eupatorium perfoliatum L.: Common Boneset; (C = 4); frequent; open fen and wet meadow; JLA 349.

Euthamia graminifolia (L.) Nutt. var. *graminifolia* (=*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fern.): Flat-Top Goldenrod; (C = 3); rare; open wet meadow; PER 4213.

Helianthus giganteus L.: Giant Sunflower; (C = 6); rare; open wet meadow; PER 4230.

Hieracium piloselloides Vill. (=*Hieracium florentinum* All. (F.)): Tall Hawkweed; (*); rare; open meadow; JLA 164.

Hieracium scabrum Michx.: Rough Hawkweed; (C = 5); infrequent; open meadow; PER 4199.

Leucanthemum vulgare Lam. (=*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte): Ox-Eye Daisy; (*); frequent; open meadow; JLA 159.

Packera aurea (L.) A. & D. Löve (=*Senecio aureus* L.): Golden Ragwort; (C = 4); abundant; mesic woods, seepage wetlands, open fen, and open wet meadow; JLA 27.

Rudbeckia hirta L.: Black-Eyed Susan; (C = 2); frequent; open wet meadow; JLA 262.

Solidago caesia L.: Wreath Goldenrod; (C = 7); frequent; mesic woods; JLA 376.

Solidago juncea Aiton: Early Goldenrod; (C = 3); frequent; along trail edges; JLA 346.

Solidago nemoralis Aiton: Gray Goldenrod; (C = 3); rare; open field; PER 4232.

Solidago patula Muhl.: Roundleaf Goldenrod; (C = 8); infrequent; open wet meadow; JLA 374.

Symphyotrichum dumosum (L.) Nesom (=*Aster dumosus* L.): Rice Button Aster; (C = 4); frequent; along wooded trail edges; JLA 387.

Symphyotrichum firmum (Nees) Neson (=*Aster puniceus* L. var. *firmus* (Nees) Torr. & Gray)

Symphyotrichum lateriflorum (L.) A. & D. Löve (=*Aster lateriflorus* (L.) Britton): Calico Aster; (C = 3); infrequent; mesic woods; JLA 377.

Symphyotrichum lanceolatum (Willd.) Nesom (=*Aster simplex* Willd.): White Panicle Aster; (C = 3); infrequent; mesic woods; JLA 375.

Symphyotrichum puniceum (L.) A. & D. Löve (=*Aster puniceus* L.): Purplestem Aster; (C = 7); abundant; seepage wetlands and open fen; JLA 396.

Vernonia gigantea (Walt.) Trel. (=*Vernonia altissima* Nutt. var. *taeniotricha* S.F. Blake): Giant Ironweed; (C = 2); frequent; open fen, open wet meadow, and along trail edge; JLA 302.

BALSAMINACEAE (Touch-Me-Not Family)

Impatiens capensis Meerb.:Jewelweed; (C = 2); frequent; seepage wetlands and open fen; JLA 283.

BERBERIDACEAE (Barberry Family)

Berberis thunbergii DC.: Japanese Barberry; (*); infrequent; mesic woods; JLA 86.

Podophyllum peltatum L.: May Apple; (C = 3); abundant; mesic woods; JLA 24.

BETULACEAE (Birch Family)

Carpinus caroliniana Walter var. *virginiana* (Marshall) Fern.: American Hornbeam; (C = 5); infrequent; mesic woods; JLA 324.

Ostrya virginiana (Mill.) K. Koch: Hop Hornbeam; (C = 5); infrequent; mesic forest; JLA 356.

BORAGINACEAE (Borage Family)

Hackelia virginiana (L.) I. M. Johnst.: Beggarslice; (C = 0); frequent; mesic woods; JLA 358.

BRASSICACEAE (Mustard Family)

Cardamine bulbosa (Schreb. ex Muhl.) BSP.: Bulbous Bittercress; (C = 4); infrequent; mesic woods; JLA 10.

Cardamine concatenata (Michx.) Sw. (=*Dentaria laciniata* Willd.): Cutleaf Toothwort; (C = 4); frequent; mesic forest; JLA 6.

Cardamine pensylvanica Muhl. ex Willd: Pennsylvania Bitter Cress; (C = 2); infrequent; open fen; JLA 218.

Nasturtium officinale Ait. f. (=*Nasturtium officinale* R. Br.): Water Cress; (*); infrequent; seepage wetland; JLA 35.

CAMPANULACEAE (Bellflower Family)

Campanulastrum americanum (L.) Small (=*Campanula americana* L.): American Bellflower; (C = 4); frequent; seepage wetlands and along wooded trail; JLA 288.

Lobelia inflata L.: Indian Tobacco; (C = 3); frequent; mesic woods and along trail; JLA 300.

Lobelia siphilitica L.: Great Blue Lobelia; (C = 3); infrequent; mesic woods; JLA 353.

CAPRIFOLIACEAE (Honeysuckle Family)

Diervilla lonicera P. Mill.: Northern Bush Honeysuckle; (R, C = 9); infrequent; along wooded trail; JLA 187.

Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (=*Sambucus canadensis* L.): Common Elderberry; (C = 2); frequent; seepage wetlands; JLA 409.

Viburnum acerifolium L.: Maple-Leaf Viburnum; (C = 8); frequent; mesic woods; JLA 137.

Viburnum lentago L.: Nannyberry; (C = 5); frequent; along trail by open fen; JLA 64.

Viburnum prunifolium L.: Black Haw; (C = 4); infrequent; mesic woods; JLA 169.

CARYOPHYLLACEAE (Pink Family)

Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (=Cerastium vulgatum L.): Big Chickweed; (*); infrequent; open meadow; JLA 69.

Dianthus armeria L.: Deptford Pink; (*); frequent; open fen and wet meadow; JLA 267.

CELASTRACEAE (Staff-Tree Family)

Euonymous obovatus Nutt.: Running Strawberry Bush; (C = 7); infrequent; mesic woods; JLA 135.

CERATOPHYLLACEAE (Hornwort Family)

Ceratophyllum demersum L.: Coon's Tail; (C = 1); abundant; pond; JLA 210.

CLUSIACEAE (Mangosteen Family)

Hypericum punctatum Lam.: Spotted St. John's Wort; (C = 3); infrequent; open meadow; JLA 266.

CONVOLVULACEAE (Morning-Glory Family)

Ipomoea pandurata (L.) G.F.W. Mey.: Man of the Earth; (C = 3); infrequent; open meadow; JLA 158.

CORNACEAE (Dogwood Family)

Cornus alternifolia L.f.: Alternate Leaf Dogwood; (C = 8); common; mesic woods, seepage wetlands, and open fen; JLA 127.

Cornus florida L.: Flowering Dogwood; (C = 4); frequent; mesic woods; JLA 14.

Cornus obliqua Raf.: Silky Dogwood; (C = 5); infrequent; seepage wetland; JLA 245.

Cornus racemosa Lam.: Gray Dogwood; (C = 2); frequent; open fen and wet meadow; JLA 163.

Cornus sericea L. (=*Cornus stolonifera* Michx.): Redosier Dogwood; (C = 4); frequent; mesic woods, seepage wetlands, and open fen; JLA 65.

CYPERACEAE (Sedge Family)

Carex albursina Sheldon: White Bear Sedge; (C = 7); infrequent; mesic woods; JLA 116.

Carex amphibola Steud.: Eastern Narrowleaf Sedge; (C = 8); infrequent; along trail; JLA 91.

Carex blanda Dewey: Eastern Woodland Sedge; (C = 1); infrequent; mesic woods; JLA 50.

Carex bromoides Schkuhr. ex Willd.: Bromelike Sedge; (C = 10); infrequent; seepage wetland; JLA 175.

Carex communis Bailey: Fibrousroot Sedge; (C = 8); frequent; wooded border of seepage wetlands; JLA 26.

Carex crinita Lam.: Fringed Sedge; (C = 8); infrequent; south side of open fen; JLA 184.

Carex digitalis Willd.: Slender Woodland Sedge; (C = 7); infrequent; mesic woods; JLA 81.

Carex gracilescens Steud.: Slender Looseflower Sedge; (C = 5); infrequent; open wet meadow and along wooded trail; JLA 165.

Carex gracillima Schwein.: Graceful Sedge; (C = 7); frequent; along wooded trail; JLA 53.
Carex granularis Muhl. ex Willd.: Limestone Meadow Sedge; (C = 2); frequent; mesic woods; JLA 142.
Carex grisea Wahlenb.: Inflated Narrowleaf Sedge; (C = 3); frequent; mesic woods and along trail; JLA 44.
Carex hitchcockiana Dewey: Hitchcock's Sedge; (C = 8); infrequent; mesic woods; JLA 129.
Carex hystericina Muhl. ex Willd.: Bottlebrush Sedge; (C = 5); frequent; open wet meadow; JLA 98.
Carex interior Bailey: Inland Sedge; (C = 8); infrequent; north side of open fen; JLA 66.
Carex lasiocarpa Ehrh. var. *americana* Fern.: American Woollyfruit Sedge; (C = 10); frequent; open fen and marsh areas; JLA 181.
Carex laxiculmis Schwein var. *laxiculmis*: Spreading Sedge; (C = 7); infrequent; along wooded trail; JLA 51.
Carex laxiflora Lam.: Broad Looseflower Sedge; (C = 7); infrequent; mesic woods; JLA 38.
Carex leptalea Wahlenb.: Bristlystalked Sedge; (C = 8); infrequent; open wet meadow; JLA 103.
Carex lurida Wahlenb.: Shallow Sedge; (C = 4); infrequent; seepage wetland; JLA 144.
Carex muehlenbergii Schkuhr ex Willd. var. *muehlenbergii*: Muhlenberg's Sedge; (C = 5); infrequent; along trail in mesic woods; JLA 294.
Carex pellita Muhl. ex Willd.: Woolly Sedge; (C = 2); infrequent; open wet meadow; JLA 99.
Carex pensylvanica Lam.: Pennsylvania Sedge; (C = 5); infrequent; slightly dry field between oak woods and fen; JLA 72.
Carex prasina Wahlenb.: Drooping Sedge; (C = 10); infrequent; seepage wetland; JLA 176.
Carex rosea Schkuhr ex Willd.: Rosy Sedge; (C = 5); frequent; mesic woods and along trail; JLA 42.
Carex scabrata Schwein.: Eastern Rough Sedge; (E, C = 10); infrequent; seepage wetland; JLA 138.
Carex stipata Muhl. ex Willd. var. *stipata:* Owlfruit Sedge; (C = 2); abundant; open fen and seepage wetlands; JLA 78.
Carex stricta Lam.: Upright Sedge; (C = 5); frequent; open fen and wet meadow; JLA 97.
Carex suberecta (Olney) Britton: Prairie Straw Sedge; (C = 5); frequent; open fen and wet meadow; JLA 180.
Carex swanii (Fern.) Mackenzie.: Swan's Sedge; (C = 4); infrequent; open meadow; JLA 150.
Carex tonsa (Fern.) Bickn. var. *tonsa:* Shaved Sedge; (C = 9); infrequent; open meadow; JLA 70.
Carex vulpinoidea Michx.: Fox Sedge; (C = 2); infrequent; south side of open fen; JLA 182.
Cyperus bipartitus Torr. (=*Cyperus rivularis* Kunth): Slender Flat Sedge; (C = 3); rare; mowed meadow; PER 4194.
Cyperus odoratus L. (=*Cyperus ferruginescens* Boeck.): Fragrant Flat Sedge; (C = 1); rare; open wet meadow; PER 4228.
Eleocharis erythropoda Steud.: Bald Spike Rush; (C = 2); infrequent; north edge of seep; JLA 141.
Eriophorum angustifolium Honckeny.: Tall Cotton Grass; (R, C = 10); infrequent; open fen; JLA 67.
Schoenoplectus tabernaemontani (K.C. Gmel.) Palla (=Scirpus validus Vahl var. creber Fern.): Softstem Bulrush; (C = 4); frequent; open fen; JLA 178.
Scirpus atrovirens Willd.: Green Bulrush; (C = 4); frequent; open wet meadow; JLA 204.
Scirpus georgianus Harper: Georgia Bulrush; (C = 3); infrequent; along drainage ditch; JLA 392.
Scirpus pendulus Muhl.: (C = 4); Rufous Bulrush; infrequent; open wet meadow; JLA 227.

DIPSACACEAE (Teasel Family)

Dipsacus fullonum L. (=*Dipsacus sylvestris* Huds.): Fuller's Teasel; (*); infrequent; open meadow; JLA 354.

ELAEAGNACEAE (Oleaster Family)

Elaeagnus angustifolia L.: Russian Olive; (*); infrequent; open meadow and along trail; JLA 76.

Elaeagnus umbellata Thunb.: Autumn Olive; (*); infrequent; open fen; JLA 343.

ERICACEAE (Heath Family)

Vaccinium angustifolium Aiton: Lowbush Blueberry; (C = 5); infrequent; mesic woods on forested knoll; JLA 450.

Vaccinium pallidum Aiton: Blue Ridge Blueberry; (C = 5); infrequent; mesic woods on forested knoll; JLA 451.

FABACEAE (Pea Family)

Amphicarpaea bracteata (L.) Fern. var. *comosa* (L.) Fern.: American Hog Peanut; (C = 5); infrequent; stream bank; PER 4201.

Desmodium paniculatum (L.) DC.: Panicledleaf Ticktrefoil; (C = 2); frequent; open fen and wet meadow; JLA 311.

Medicago lupulina L.: Black Medick; (*); infrequent; along trail; JLA 153.

Trifolium pratense L.: Red Clover; (*); infrequent; open meadow; JLA 309.

FAGACEAE (Beech Family)

Fagus grandifolia Ehrh.: American Beech; (C = 8); frequent; mesic woods; JLA 452.

Quercus alba L.: White Oak; (C = 5); rare; mesic woods; JLA 401.

Quercus rubra L.: Northern Red Oak; (C = 4); frequent; mesic woods; JLA 381.

Quercus velutina Lam.: Black Oak; (C = 4); frequent; mesic woods; PER 4231.

GENTIANACEAE (Gentian Family)

Sabatia angularis (L.) Pursh: Rose Pink; (C = 3); infrequent; along pond shoreline; JLA 280.

GERANIACEAE (Geranium Family)

Geranium maculatum L.: Spotted Geranium; (C = 4); infrequent; mesic woods; JLA 17.

GROSSULARIACEAE (Gooseberry Family)

Ribes americanum P. Mill.: American Black Currant; (C = 5); infrequent; open fen; JLA 179.

Ribes cynosbati L.: Eastern Prickly Gooseberry; (C = 4); frequent; mesic forest; JLA 34.

HALORAGACEAE (Water-Milfoil Family)

Myriophyllum sibiricum Komarov (=*Myriophyllum exalbescens* Fern.): Shortspike Water Milfoil; (C = 7); abundant; pond; JLA 212.

HAMAMELIDACEAE (Witch-Hazel Family)

Hamamelis virginiana L.: American Witch Hazel; (C = 5); infrequent mesic woods; JLA 322.

HYDROCHARITACEAE (Frog's-Bit Family)

Elodea canadensis Michx.: Canadian Waterweed; (C = 3); frequent; pond; JLA 214.

IRIDACEAE (Iris Family)

Iris virginica L. var. *shrevei* (Small) E. S. Anderson: Shreve's Iris; (C = 5); infrequent; along pond shoreline; JLA 93.

Sisyrinchium angustifolium P. Mill.: Narrowleaf Blue-Eyed Grass; (C = 3); infrequent; open meadow and along trail; JLA 92.

JUGLANDACEAE (Walnut Family)

Carya ovata (Mill.) K. Koch: Shagbark Hickory; (C = 5); infrequent; mesic woods; JLA 394.

JUNCACEAE (Rush Family)

Juncus articulatus L.: Jointleaf Rush; (E, C = 4); rare; open fen; PER 4195.

Juncus brachycephalus (Engelm.) Buchenau: Smallhead Rush; (C = 7); infrequent; open wet meadow; PER 4240.

Juncus dudleyi Wiegand: Dudley's Rush; (C = 2); infrequent; open wet meadow; JLA 205.

Juncus effusus L.: Common Rush; (C = 3); frequent; open fen and wet meadow; JLA 222.

Juncus tenuis Willd.: Poverty Rush; (C = 0); frequent; mesic woods and open wet meadow; PER 4198.

Luzula multiflora (Retz.) Lej.: Common Wood Rush; (C = 6); frequent; mesic woods and open wet meadow; JLA 58.

LAMIACEAE (Mint Family)

Blephilia ciliata (L.) Benth.: Downy Pagoda Plant; (C = 7); infrequent; open wet meadow; JLA 260.

Blephilia hirsuta (Pursh) Benth.: Hairy Pagoda Plant; (C = 5); infrequent; mesic woods and along path; JLA 256.

Glechoma hederacea L.: Ground Ivy; (*); infrequent; mesic woods; JLA 23.

Lycopus americanus Muhl. ex W. Bart: American Water Horehound; (C = 3); frequent; open fen and wet meadow; JLA 334.

Lycopus uniflorus Michx.: Northern Bugle Weed; (C = 5); infrequent; open fen; PER 4239.

Mentha spicata L.: Spearmint; (*); infrequent; open fen; JLA 405.

Prunella vulgaris L.: Common Self Heal; (C = 1); infrequent; open meadow; JLA 275.

Scutellaria lateriflora L.: Blue Skullcap; (C = 4); infrequent; seepage wetlands; JLA 323.

LAURACEAE (Laurel Family)

Lindera benzoin (L.) Blume: Hairy Spicebush; (C = 5); abundant; mesic woods, edge of seepage wetlands and open fen; JLA 79.

Sassafras albidum (Nutt.) Nees: Sassafras; (C = 1); infrequent; mesic woods; JLA 293.

LEMNACEAE (Duckweed Family)

Lemna minor L.: Common Duckweed; (C = 3); abundant; seepage wetlands and pond; JLA 123.

Lemna trisulca L.: Star Duckweed; (C = 6); infrequent; pond; JLA 253.

Spirodela polyrhiza (L.) Schleid.: Common Duckmeat; (C = 5); infrequent; pond; JLA 217.

LENTIBULARIACEAE (Bladderwort Family)

Utricularia macrorhiza Le Conte (=*Utricularia vulgaris* L.): Common Bladderwort; (C = 5); frequent; pond; JLA 318.

LILIACEAE (Lily Family)

Allium canadense L.: Meadow Garlic; (C = 1); infrequent; open wet meadow; JLA 59.

Allium tricoccum Aiton: Wild Leek; (C = 7); infrequent; moist woods; JLA 1.

Erythronium americanum Ker Gawl.: Dogtooth Violet; (C = 5); infrequent; mesic woods; JLA 0.

Lilium michiganense Farw.: Michigan Lily; (C = 5); rare; mesic woods near stream; JLA 250.

Maianthemum canadense Desf.: Canada Mayflower; (C = 8); infrequent; mesic woods; JLA 73.

Maianthemum stellatum (L.) Link (=*Smilacina stellata* (L.) Desf.): Starry False Lily of the Valley; (C = 6); infrequent; seepage area; JLA 40.

Trillium grandiflorum (Michx.) Salisb.: White Trillium; (C = 7); infrequent; hilltop in mesic woods; JLA 21.

Trillium recurvatum L. C. Beck: Bloody Butcher; (C = 4); infrequent; mesic woods; JLA 52.

LIMNANTHACEAE (Meadow-Foam Family)

Floerkea proserpinacoides Willd.: False Mermaid Weed; (C = 5); infrequent; mesic woods; JLA 60.

LYTHRACEAE (Loosestrife Family)

Decodon verticillatus (L.) Ell. Swamp Loosestrife; (C = 8); frequent; pond and seepage wetland; LA 313.

MAGNOLIACEAE (Magnolia Family)

Liriodendron tulipifera L.: Tulip Tree; (C = 4); frequent; mesic woods; JLA 132.

MORACEAE (Mulberry Family)

Morus alba L.: White Mulberry; (*); infrequent; mesic woods; JLA 188.

NYMPHAEACEAE (Water Lily Family)

Nuphar lutea (L.) Sm. ssp. *advena* (Ait.) Kartesz & Gandhi: Yellow Pond-Lily; (C = 6); abundant; pond; JLA 166.

Nymphaea odorata Ait. ssp. *tuberosa* (Paine) Wiersma & Hellquist (=*Nymphaea tuberosa* Paine): American White Water Lily; (C = 6); abundant; pond; JLA 316.

OLEACEAE (Olive Family)

Fraxinus americana L.: White Ash; (C = 4); abundant; mesic woods; JLA 143.

Fraxinus nigra Marshall: Black Ash; (C = 7); infrequent; moist forest; PER 4204.

ONAGRACEAE (Evening Primrose Family)

Circaea lutetiana L. var. *canadensis* L. Aschers. & Magnus: Enchanter's Nightshade; (C = 2); frequent; mesic woods and trail edges; JLA 238.

Epilobium leptophyllum Raf.: Bog Willow Herb; (C = 10); infrequent; open fen; JLA 402.

Oenothera biennis L.: Common Evening Primrose; (C = 0); rare; along wooded trail; JLA 370.

ORCHIDACEAE (Orchid Family)

Cypripedium reginae Walter: Showy Lady's Slipper; (C = 10); infrequent; open fen; JLA 248.

Platanthera huronensis (Nutt.) Lindl. (=*Habenaria hyperborea* (L.) R. Br. var. *huronensis* (Nutt.) Farw.): Huron Green Orchid; (T, C =10); rare; seepage wetland; JLA 124.

Liparis loeselii (L.) L.C. Rich.: Yellow Widelip Orchid; (C = 4); rare; open wet meadow; JLA 154.

Spiranthes cernua (L.) L.C. Rich.: Nodding Lady's Tresses; (C = 3); rare; open wet meadow; PER 4222.

OXALIDACEAE (Wood Sorrel Family)

Oxalis stricta L.: Common Yellow Oxalis; (C = 0); frequent; along trail; JLA 269.

PHRYMACEAE (Lopseed Family)

Phryma leptostachya L.: American Lopseed; (C = 4); infrequent; mesic woods; JLA 282.

PLANTAGINACEAE (Plantain Family)

Plantago rugelii Dcne.: Blackseed Plantain; (C = 0); frequent; along trail; JLA 259.

POACEAE (Grass Family)

Agrostis perennans (Walt.) Tuckerman: Upland Bent Grass; (C = 2); infrequent; open wet meadow and mesic woods; PER 4233.

Cinna arundinacea L.: Sweet Wood Reed; (C = 4); infrequent; moist woods; PER 4192.

Danthonia spicata (L.) Beauv. ex Roemer & J.A. Schultes: Poverty Oat Grass; (C = 3); frequent; open meadow, mesic woods, and along trail; JLA 234.

Dichanthelium acuminatum (Sw.) Gould & C.A. Clark var. *fasciculatum* (Torr.) Freckmann (=*Panicum implicatum fasciculatum*): Western Panic Grass; (C = 10); infrequent; open wet meadow; JLA 278.

Dichanthelium acuminatum (Sw.) Gould & C.A. Clark var. *lindheimeri* (Nash) Gould & C.A. Clark (=*Panicum lindheimeri* Nash): Lindheimer Panic Grass; (C = 5); infrequent; open wet meadow; JLA 225.

Digitaria sanguinalis (L.) Scop.: Hairy Crab Grass; (*); infrequent; open wet meadow; PER 4227.

Elymus hystrix L. (=*Hystrix patula* Moench): Eastern Bottlebrush Grass; (C = 5); infrequent; along wooded trail; JLA 255.

Festuca subverticillata (Pers.) Alexeev (=*Festuca obtusa* Biehler): Nodding Fescue; (C = 4); frequent; mesic woods along trail; JLA 119.

Glyceria striata (Lam.) A.S. Hitchc.: Fowl Mannagrass; (C = 4); abundant; wet woods and along trail; JLA 121.

Leersia oryzoides (L.) Sw.: Rice Cut Grass; (C = 2); frequent; open fen and seepage wetlands; PER 4193.

Muhlenbergia mexicana (L.) Trin.: Mexican Muhly; (C = 4); infrequent; open wet meadow; PER 4221.

Panicum rigidulum Bosc ex Nees var. *rigidulum* (=*Panicum rigidulum* Nees): Red-top Panic Grass; (C = 4); infrequent; open wet meadow; PER 4212.

Phalaris arundinacea L.: Reed Canary Grass; (*); frequent; open wet meadows and along trail; JLA 108.

Poa annua L.: Annual Blue Grass; (*); frequent; along trails; JLA 62.

Poa compressa L.: Canada Blue Grass; (*); infrequent; along trail; JLA 326.

Schedonorus phoenix (Scop.) Holub. (= *Festuca eliator* L.): Tall Fescue ; (*); frequent; open meadow; JLA 190.

Sphenopholis intermedia (Rydb.) Rydb.: Slender Wedgescale; (C = 3); infrequent; seepage area; JLA 83.

POLEMONIACEAE (Phlox Family)

Phlox divaricata L.: Wild Blue Phlox; (C = 5); infrequent; along trail; JLA 12.

POLYGALACEAE (Milkwort Family)

Polygala sanguinea L.: Purple Milkwort; (C = 4); infrequent; open canopy along trail; JLA 284.

POLYGONACEAE (Smartweed Family)

Persicaria arifolia (L.) Haroldson (=*Polygonum arifolium* L. var. *pubescens* (Keller) Fern.): Halberd-Leaf Tear-Thumb; (C = 10); infrequent; seepage area; PER 4217.

Persicaria hydropiperoides (Michx.) Small (=*Polygonum hydropiperoides* Michx.): Swamp Smartweed; (C = 3); frequent; pond; JLA 290.

Persicaria lapathifolia (L.) S.F. Gray (=*Polygonum lapathifolium* L.): Curlytop Knotweed; (C = 0); infrequent; open wet meadow; PER 4224.

Persicaria punctata (Ell.) Small (=*Polygonum punctatum* Elliott): Dotted Smartweed; (C = 3); infrequent; mesic to wet woods; PER 4202.

Rumex orbiculatus Gray var. *borealis* Rech. f.: Greater Water Dock; (C = 7); infrequent; seepage wetland; PER 4219.

Rumex verticillatus L.: Swamp Dock; (C = 5); infrequent; along wet trail; JLA 232.

Tovara virginiana (L.) Raf. (=*Polygonum virginianum* L.): Jumpseed; (C = 3); infrequent; mesic woods; JLA 279.

PONTEDERIACEAE (Pickerelweed Family)

Heteranthera dubia (Jacq.) MacMill: Grassleaf Mud Plantain; (C = 4); frequent; pond; JLA 215.

Pontederia cordata L.: Pickerel Weed; (C = 5); frequent; pond; JLA 263.

PORTULACACEAE (Purslane Family)

Claytonia virginica L.: Virginia Spring Beauty; (C = 2); frequent; mesic woods; JLA 8.

POTAMOGETONACEAE (Pondweed Family)

Stuckenia pectinata (L.) Boerner (=*Potamogeton pectinata* L.): Sago Pondweed; (C = 3); frequent; pond; JLA 211.

PRIMULACEAE (Primrose Family)

Lysimachia quadriflora Sims: Four-flower Yellow Loosestrife; (C = 9); infrequent; open wet meadow; JLA 261.

RANUNCULACEAE (Buttercup Family)

Actaea pachypoda Ell.: White Baneberry; (C = 7); frequent; mesic woods; JLA 359.

Anemone virginiana L.: Tall Thimbleweed; (C = 4); infrequent; edge of seepage wetland; JLA 274.

Caltha palustris L.: Yellow Marsh Marigold; (C = 7); frequent; seepage wetlands, stream banks, and open fen; JLA 9.

Enemion biternatum Raf. (=*Isopyrum biternatum* (Raf.) T. & G.): Eastern False Rue Anemone; (C = 5); frequent; mesic woods; JLA 5.

Ranunculus abortivus L.: Little-Leaf Buttercup; (C = 0); infrequent; mesic woods; JLA 128.

Ranunculus longirostis Godr. (= *Ranunculus longirostris* Godr.): Longbeak Buttercup; (C = 7); frequent; pond; JLA 209.

Ranunculus hispidus var. *nitidus* (Elliott) T. Duncan: Bristly Buttercup; (C = 5); infrequent; seepage area; JLA 174.

Ranunculus recurvatus Poir.: Blisterwort; (C = 5); frequent; moist mesic woods; JLA 136.

Ranunculus repens L.: Creeping Buttercup; (*); infrequent; seepage wetland and fen; JLA 36.

Thalictrum dioicum L.: Early Meadow Rue; (C = 7); infrequent; mesic woods; JLA 43.

Thalictrum thalictroides (L.) Eames & Boivin (=*Anemonella thalictroides* (L.) Spach): Rue Anemone; (C = 7); frequent; mesic woods; JLA 15.

ROSACEAE (Rose Family)

Agrimonia gryposepala Wallr.: Tall Hairy Agrimony; (C = 2); infrequent; mesic woods; JLA 304.

Agrimonia parviflora Aiton: Harvestslice; (C = 4); infrequent; wet woods; JLA 303.

Agrimonia pubescens Wallr.: Soft Agrimony; (C = 5); infrequent; mesic woods; JLA 295.

Crataegus pruinosa (H. Wendl.) K. Koch: Waxyfruit Hawthorne; (C = 5); frequent; open wet meadow and along trails; JLA 71.

Fragaria virginiana Duchesne: Virginia Strawberry; (C = 2); infrequent; open meadow; JLA 28.

Geum canadense Jacq.: White Avens; (C = 1); frequent; mesic forest and along trails; JLA 197.

Malus pumila Mill.: Paradise Apple; (*); infrequent; mesic woods and along trails; JLA 30.

Potentilla simplex Michx.: Common Cinquefoil; (C = 2); infrequent; open wet meadow; JLA 96.

Prunus serotina Ehrh.: Wild Black Cherry; (C = 1); frequent; mesic woods; JLA 173.

Rosa multiflora Thunb.: Multiflora Rose; (*); infrequent; mesic woods; JLA 117.

Rosa palustris Marshall: Swamp Rose; (C = 5); infrequent; open wet meadow; JLA 206.

Rubus abactus L.H. Bailey (=*Rubus pensylvanicus* Poir.): Pennsylvania Blackberry; (C = 5); infrequent; along trail; JLA 198.

Rubus allegheniensis Porter: Allegheny Blackberry; (C = 2); infrequent; along trails and along pond shoreline; JLA 87.

Rubus flagellaris Willd.: Northern Dewberry; (C = 2); infrequent; edge of open meadow; JLA 167.

Rubus occidentalis L.: Black Raspberry; (C = 2); infrequent; along trail; JLA 155.

RUBIACEAE (Madder Family)

Galium aparine L.: Sticky Willy; (C = 1); abundant; mesic woods and along trails; JLA 46.

Galium circaezans Michx. var. *circaezans*: Licorice Bedstraw; (C = 7); infrequent; mesic woods; JLA 131.

Galium circaezans Michx. var. *hypomalacum* Fern.: Licorice Bedstraw; (C = 7); infrequent; seepage wetland; JLA 251.

Galium concinnum T. & G.: Shining Bedstraw; (C = 5); infrequent; wooded edge; JLA 208.

Galium mollugo L.: False Baby's Breath; (*); infrequent; open wet meadow; JLA 223.

Galium triflorum Michx.: Fragrant Bedstraw; (C = 5); abundant; mesic woods; JLA 244.

RUTACEAE (Rue Family)

Zanthoxylum americanum P. Mill.: Common Prickly Ash; (C = 3); infrequent; open fen edge; JLA 329.

SALICACEAE (Willow Family)

Populus deltoides Bartr. ex Marshall: Eastern Cottonwood; (C = 1); infrequent; mesic woods; JLA 189.

Populus grandidentata Michx.: Big-Tooth Aspen; (C = 4); rare; mesic forest; JLA 186.

Populus tremuloides Michx.: Quaking Aspen; (C = 2); infrequent; open fen; JLA 341.

Salix discolor Muhl.: Pussy Willow; (C = 4); infrequent; open wet meadow and edge of seepage wetland; JLA 3.

Salix eriocephala Michx.: Missouri River Willow; (T, C = 4); rare; mowed meadow; JLA 230.

Salix nigra Marshall: Black Willow; (C = 3); infrequent; seepage wetland; JLA 33.

SAXIFRAGACEAE (Saxifrage Family)

Chrysosplenium americanum Schwein.: American Golden Saxifrage; (T, C = 10); infrequent; seepage wetland; JLA 61.

Mitella diphylla L.: Two-Leaf Miterwort; (C = 7); infrequent; stream bank; JLA 49.

Penthorum sedoides L.: Ditch Stonecrop; (C = 5); infrequent; seepage wetland; JLA 306.

Saxifraga pensylvanica L.: Eastern Swamp Saxifrage; (C = 10); infrequent; seepage wetland; JLA 140.

SCROPHULARIACEAE (Figwort Family)

Agalinis purpurea (L.) Pennell: Purple False Foxglove; (C = 6); infrequent; open fen; JLA 406.

Chelone glabra L.: White Turtlehead; (C = 7); rare; mesic woods; PER 4207.

Pedicularis lanceolata Michx.: Swamp Lousewort; (C = 6); infrequent; open wet meadow and seepy thicket; JLA 388.

Veronica serpyllifolia L.: Thyme-Leaf Speedwell; (*); frequent; along trails; JLA 63.

SOLANACEAE

Solanum ptycanthum Dunal (=*Solanum americanum* Mill.): West Indian Nightshade; (C = 0); infrequent; along trails.

TILIACEAE (Linden Family)

Tilia americana L. var. *americana*: American Basswood; (C = 5); frequent; mesic forest; PER 4205.

TYPHACEAE (Cat-Tail Family)

Typha angustifolia L.: Narrow-Leaf Cattail; (*); frequent; open fen, seepage areas, open wet meadow edge; JLA 273.

Typha latifolia L.: Broad-Leaf Cattail; (C = 1); frequent; open fen, seepage areas, open wet meadow edge; JLA 335.

ULMACEAE (Elm Family)

Ulmus americana L.: American Elm; (C = 5); frequent; mesic woods; JLA 368.

URTICACEAE (Nettle Family)

Boehmeria cylindrica (L.) Sw.: Smallspike False Nettle; (C = 3); infrequent; open wet meadow; JLA 268.

Laportea canadensis (L.) Wedd.: Canadian Wood Nettle; (C = 2); infrequent; seepage wetland; JLA 286.

Pilea fontana (Lunell) Rydb.: Lesser Clearweed; (C = 5); infrequent; open wet meadow ; JLA 391.

Pilea pumila (L.) A. Gray: Canadian Clearweed; (C = 2); infrequent; seepage wetland; JLA 242.

VERBENACEAE (Vervain Family)

Verbena hastata L.: Swamp Verbena; (C = 3); infrequent; open fen and wet meadow; JLA 301.

VIOLACEAE (Violet Family)

Viola canadensis L.: Canadian White Violet; (C = 8); infrequent; mesic woods; JLA 13.

Viola cucullata Aiton: Marsh Blue Violet; (C = 9); frequent; open fen and wet meadow; JLA 68.

Viola pubescens Aiton : Downy Yellow Violet; (C = 5); frequent; mesic woods; JLA 22.

Viola rostrata Pursh.: Long-Spur Violet; (C = 8); infrequent; mesic woods; JLA 11.

Viola sororia Willd.: Common Blue Violet; (C = 1); abundant; mesic woods; JLA 16.

VITACEAE (Grape Family)

Parthenocissus quinquefolia (L.) Planch.: Virginia Creeper; (C = 2); frequent; mesic forest; JLA 196.

Parthenocissus vitacea (Knerr) A.S. Hitchc. (=*Parthenocissus inserta* (A. Kern.) C. Fritsch): Woodbine; (C = 2); infrequent; mesic forest; JLA 228.

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1. Create text in 12-point Times New Roman font and double space paragraphs throughout. Papers should be organized as follows: Title, Author(s) and address(es), Abstract with up to 5 keywords, Introduction, Materials and Methods, Results, Discussion, Acknowledgements, Literature Cited, Tables, Figure Legends, and Figures. Sections may be omitted if not relevant. All pages should be numbered. Please contact the editor regarding any questions related to formatting.

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On the cover: *Chrysosplenium americanum* and fruit (inset) at Little Calumet Headwaters Nature Preserve, LaPorte County, Indiana. Photograph taken by Dr. Paul Rothrock 2004.

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TWO RECORDS OF ACHLOROPHYLLOUS *CYPRIPEDIUM ACAULE* FROM WISCONSIN

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The pink lady's slipper orchid (*Cypripedium acaule* Aiton.) is one of the more common orchid species in the Great Lakes region, occurring in habitats ranging from dry sandy upland woods under mixed oaks, pines, or aspens to lowland bogs amidst sphagnum moss and beneath cedar, spruce, or tamarack (Voss, 1972; Luer 1975; Case, 1987). The plant also ranges over much of eastern North America (Case, 1987; Cribb, 1997). Variants of the plant have been recorded throughout its range, including plants with two flowers per inflorescence and a white flowered variant (Cribb, 1997). The white flowered variant of the pink lady's slipper (f. *albiflora* Rand & Redfield) is a rare find and typically occurs in the northeastern part of the plant's range (Luer, 1975). This variant is not a true albino or achlorophyllous plant because it contains chlorophyll and derives most of its energy through photosynthesis. Achlorophyllous plants are thought to lack chlorophyll and other pigments that are associated with photosynthesis (Cummings & Welschmeyer, 1998). However, Cummings and Welschmeyer (1998) found in their study of ten apparent achlorophyllous plant species, representing four families (Lennoaceae, Monotropaceae, Orchidaceae, and Orobanchaceae), that chlorophyll and other chlorophyll-related pigments were present although, at dramatically reduced levels. Although no previous record of a seemingly achlorophyllous pink lady's slipper is known (Fred Case, personal communication, 20 October 2005), the purpose of this article is to announce the discovery of two separate occurrences of apparent achlorophyllous variants of pink lady's slipper in Wisconsin.

Achlorophyllous orchids demonstrate an apparent absence of chlorophyll. Rather than harnessing their energy via photosynthesis, these plants are theorized to be mycotrophic which means that they parasitize mycorrhizal fungi for nutrients and carbon compounds (Furman & Trappe, 1971). The parasitized fungi, in turn, gain their nutrients and compounds from external sources such as photosynthesizing green plants or from the soil or decomposing organic matter and therefore act as a bridge between a source of nutrients and the apparent achlorophyllous plant (Furman & Trappe, 1971). A non-orchid example of this relationship is shown in a study conducted by Bjorkman (1960) on *Monotropa hypopitys*. Bjorkman (1960) demonstrated that *Monotropa* shared mycorrhizal fungi with nearby trees and that nutrient materials passed from the trees, through

Figure 1. Achlorophyllous variant of pink lady's slipper orchid. The plant's labellum is pink in color, the sepals are light brown, and the leaves and stem are seemingly achlorophyllous. Photographed in a Waushara County, Wisconsin red pine plantation during the summer of 1975 by Guy David.

the fungi and into the *Monotropa*. Bjorkman (1960) also found that mycorhizal development was stimulated toward growth by a substance produced by *Monotropa*, thereby showing that the fungi also benefit from the relationship with *Monotropa*. A systematic study on the mycotrophic nature of seemingly achlorophyllous pink lady's slippers has not been conducted and therefore it can only be theorized that they have a similar method of survival to that of other achlorophyllous plants such as *Monotropa hypopitys*.

The pink lady's slipper orchid is not the only apparent achlorophyllous species in the orchid family. An uncommon, seemingly achlorophyllous variant of hellborine orchid (*Epipactus helleborine*) is also known (Case, 1987). This variant of hellborine orchid has been found in Illinois and Quebec and could be the result of a relationship with symbiotic fungi that allows the plant to survive without producing the amount of chlorophyll typically necessary to sustain life (Case, 1987). In the genus *Corallorhiza,* the apparent lack of chlorophyll is common due to a close relationship with symbiotic fungi (Luer, 1975; Case, 1987). This relationship allows the plant to flower only in favorable years and remain dormant in others (Luer, 1975). The occurrence of seemingly achlorophyllous variants in other genera of orchids demonstrates the strong relationship that these plants have with symbiotic fungi. This relationship is present in the pink lady's slipper as well. According to Cribb (1997), C. J. Sheviak presented a photograph showing pink lady's slipper in a fairy ring, which suggests that mycorrhizal fungi within the fairy ring are in symbiosis with the orchid.

Figure 2. Apparent achlorophyllous variant of pink lady's slipper orchid. The plant's leaves are reduced in size and seemingly achlorophyllous. Photographed by Matt Bushman in a Price County, Wisconsin conifer swamp on the 22nd of June, 2005.

The two Wisconsin occurrences of the apparent achlorophyllous variant of pink lady's slipper were found in separate locations and in different years. The first reported occurrence was from central Wisconsin in Waushara County during the summer of 1975 when two seemingly achlorophyllous plants where found and photographed by Guy David, then a student at UW-Stevens Point. The plants occurred in a red pine (*Pinus resinosa* L.) plantation with numerous other normal chlorophyllous plants of pink lady's slipper (Guy David, personal communication, 25 October 2005). The two apparent achlorophyllous plants as well as the other chlorophyllous plants at the site were flowering (Guy David, personal communication, 25 October 2005). The leaves and stems of the plants were seemingly achlorophyllous while the labellum was a typical pink color and the sepals light brown in color (Figure 1). These plants were monitored for two summers and in the following summer (1976) the apparent achlorophyllous plants were notably reduced in size and non-flowering. This may have been a reflection of a drought that occurred throughout the growing season (Guy David, personal communication, 25 October 2005).

The second occurrence of the seemingly achlorophyllous variant of pink lady's slipper was found in northwestern Wisconsin in Price County within the Chequamegon-Nicolet National Forest on the 22nd of June 2005. This plant occurred as a single sterile individual with two apparent achlorophyllous leaves (Figure 2). Other chlorophyllous pink lady's slipper plants were found within the area. The leaves appeared to be reduced in size in comparison with a typical chlorophyllous plant and had a number of holes possibly from herbivory. The plant occurred at the base of a northern white cedar (*Thuja occidentalis* L.) at the bottom of a slight topographic rise along the margin of a low conifer swamp dominated by white cedar and black ash (*Fraxinus nigra* Marshall). The top of the rise was an upland area dominated by white pine (*Pinus strobus* L.).

Note added in proof: For further reading on recent studies of achlorophyllous orchids see Julou et al. (2005).

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THE FIRST OCCURRENCE OF THE CHRYSOPHYTE ALGA *AMPHIRHIZA EPIZOOTICA* FROM NORTH AMERICA

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INTRODUCTION

There are numerous genera of golden-brown algae (Chrysophyta, Chrysophyceae) living in freshwater habitats. Reports of their distribution had been scattered throughout the algal literature for a long time, but only recently have these been summarized for North America (Nicholls & Wujek 2003).

This paper reports the occurrence of the chrysophycean alga *Amphirhiza epizootica* Skuja in Michigan, a species first described from Sweden (Skuja 1948).

METHODS AND MATERIALS

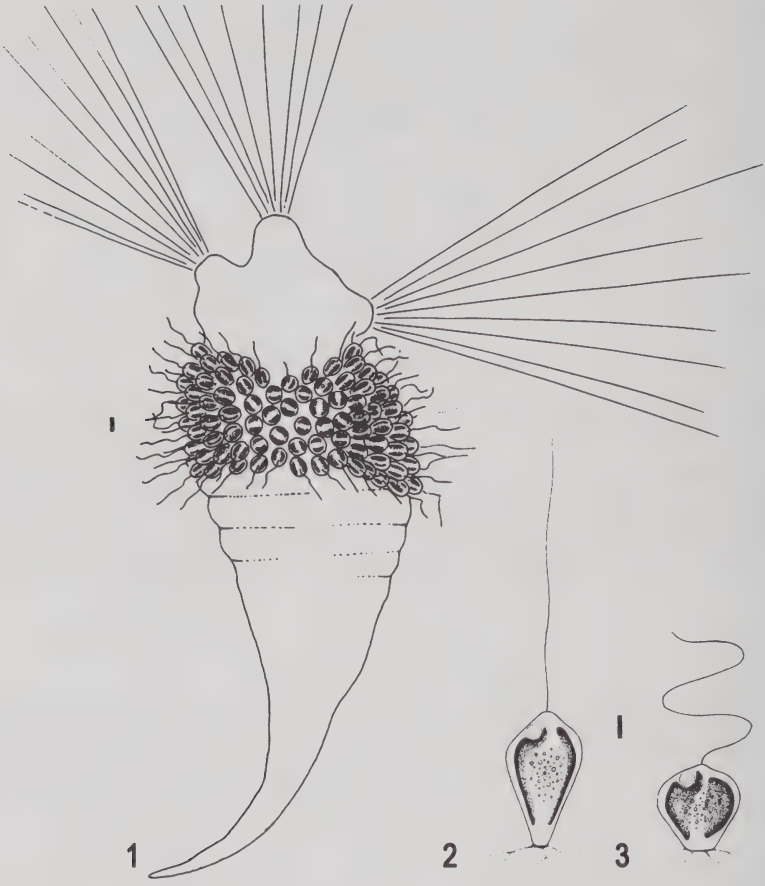
Phytoplankton samples containing *Amphirhiza* were collected with a 20 µm plankton net from Green's Lake, Beaver Island, Charlevoix County, Michigan, in September 1969, July 1970, and again in August 1977. Observations using a Zeiss Photoscope II were made both from freshly collected material, and from short term cultures grown in soil water extract or Bold's Basal Medium (Bold 1967) with additional soil water extract. Attempts to maintain cultures for extended periods failed; cultures no longer survive.

Green's Lake is dystrophic with an average depth of one meter. Approximately 88% of the lake is bordered by a *Sphagnum* bog. The pH of the lake's water ranges from 5.6–5.9. Water chemistry data include: hardness 5–10 mg/l, phosphates 0.03 mg/l, dissolved oxygen 5.4–10 mg/l, and no detectable nitrates. More detailed data are available in Griffith (1978) and Benjamin (2006).

RESULTS AND DISCUSSION

Amphirhiza epizootica has not been observed since its original description from Sweden (Skuja 1948). This report is its first for North America. Other authors who have written about this organism mention only Skuja's report without adding any new locations (Bourrelly 1957, 1981; Starmach 1986).

Amphirhiza epizootica Skuja was detected growing attached to the rotifer *Collotheca* sp. in plankton samples taken from Greene's Lake, Beaver Island, Charlevoix County (Figs. 1–3). Skuja's (1948) original description of this alga also illustrated the same genus of rotifer as the substrate. Of the more than 50 sessile *Collotheca* species, most live in a clear, gelatinous tube; only five are free-swimming and lack the gelatinous tube (Edmondson 1959). Because my samples were collected with a plankton net dragged through aquatic vegetation,



FIGURES 1–3. *Amphirhiza epizootica*. 1. Cells attached to the rotifer *Collotheca* sp. 2. Recently attached zoospore. 3. Rhizopodial stage of an attached vegetative cell. Scale bars = 3 μm

it was impossible to determine if my rotifer species was a sessile or planktonic form. If such a tube was present, the alga was attached directly to the rotifer and not on an inconspicuous sheath. The number of rotifers was relatively low. Water temperatures at the times of sampling were between 20–22°C. This corresponds with Edmondson's (1944, 1945) observations that sessile species are never present in quantities at temperatures below of 15°C, with the largest populations always being found at temperatures above 20°C.

Like Skuja, I also observed only two plastids, and these were without stigmas or pyrenoids. Cell division was observed only in the evening or night. Each daughter cell received one each of the vegetative cell's original two plastids. A new flagellum and new contractile vacuoles were seen before separation was complete. While it appeared that each new daughter cell received one of the two parental plastids, the formation of new ones was not seen. Indeed Starmach

TABLE 1. Systematic placement of *Amphirhiza epizootica* Skuja.

Author	Order	Family
Skuja (1948)	Rhizochrysidales	Euchromulinaceae
Bourrelly (1981)	Chromulinales	Chrysamoebaceae
Starmach (1986)	Chromulinales	Chrysamoebaceae

(1986) added to the cell's description by noting it contained 2–4 plastids without ever observing a cell.

The cells were very sensitive to changes in the environment. If they were not mounted, along with the rotifer, carefully onto clean glassware, they soon disintegrated. Some cells in formalin fixed samples broke free from the rotifer and became distended. Cells remaining attached either burst or also became distended. No stomatocysts were observed.

As noted by Skuja (1948), these chrysomonads live attached beneath the oral orifice of the rotifer (Fig. 1). Colonization of the host is via what appear to be uniflagellate zoospores (Fig. 2) or more often simply by vegetative division of the rhizopodially attached cells (Fig. 3). A zoospore's attachment begins at the flagellar end. As soon as this takes place, rhizopodia begin to form (Fig. 2).

Recent authorities place *Amphirhiza epizootica* in the family Chrysamoebaceae (Table 1).

It is hoped that by drawing aquatic biologists attention to what until now has been a rarely reported alga, reports of this unusual rhizopodially epizoic alga will become more common.

ACKNOWLEDGMENTS

I thank the late Dr. R.H. Thompson for drawing my attention to this organism in a sample he had collected from an unknown Kansas site, and for his sketches on which the figures are based. Brian Roberts assisted in the preparation of the illustrations, Scott McNaught identified the rotifer, and Ryan Dziedzic provided translations of the German literature.

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RANGE EXPANSION BY CUT-LEAVED TEASEL (*DIPSACUS LACINIATUS*) IN WISCONSIN AND MINNESOTA, WITH A CONSIDERATION OF GERMINATION SUCCESS

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ABSTRACT

Cut-leaved teasel, *Dipsacus laciniatus,* an exotic herbaceous plant, has been reported primarily in the southern half of Wisconsin, and its distribution in Minnesota has not been well defined. We documented the occurrence of *D. laciniatus* in Langlade County, Wisconsin, and both *D. laciniatus* and *D. fullonum* in Winona County, Minnesota. Viability of seeds harvested from the site in Langlade County was assessed by planting them in a greenhouse. Overall germination success was comparable to previously published values and indicated that the growing season in northern Wisconsin is sufficient for teasel to produce viable seeds. Seeds chilled for two months prior to planting did not differ significantly in germination success from seeds that were planted immediately (without chilling), although they germinated more quickly. Seeds that had undergone a cold treatment produced seedlings that exceeded the height of the rosettes produced by seeds without a cold treatment. The results of our germination trials may reflect an adaptive flexibility that helps *D. laciniatus* invade new habitat. The results also emphasize the need to eliminate the few teasel plants that are present in Langlade County before the population expands from its current limited distribution.

Keywords: *Dipsacus*, germination, Minnesota, teasel, Wisconsin

INTRODUCTION

Cut-leaved teasel, *Dipsacus laciniatus,* is an invasive plant established throughout much of the northeastern and midwestern United States (Solecki 1993, and references therein). Prior to this study, it was known from several counties in southern and central Wisconsin (Salamun & Cochrane 1974, N. A. Harriman in Love 1978, Wisconsin State Herbarium 2000), with additional unpublished records for Waupaca and Green Lake counties documented by specimens in the University of Wisconsin-Oshkosh herbarium (Harriman, personal communication). In Minnesota, Ownbey & Morley (1991) listed *D. laciniatus* as "introduced" but did not provide a distribution map, apparently because they did not consider the species to be naturalized. Solecki (1993) plotted the edge of the range as just reaching the southeastern tip of the state, and only two specimens (from St. Louis County) were listed in the holdings of the University of Minnesota Plant Herbarium (J. F. Bell Museum). A related species, *D. fullonum* (= *D. sylvestris* of some workers), has not been reported from Minnesota but is widespread in much of the U.S. (Solecki 1993). The purpose of this paper is to report new localities for *D. laciniatus* in Wisconsin and for both *Dipsacus*

species in southeastern Minnesota and to discuss the results of germination experiments involving *D. laciniatus*.

METHODS

Locality records for *D. laciniatus* in Wisconsin were obtained opportunistically during 1999–2000 and 2006 by searching for the conspicuous mature flowering stalks along roadsides during travel via automobile throughout the state. Records for Minnesota were obtained during field work from 2000 to the present. Voucher specimens were placed in the University of Wisconsin-Green Bay (UWGB), University of Minnesota (MIN), or Saint Mary's University (SMUMN) herbaria.

One of the new populations of *D. laciniatus* discovered during the present study occurred in Langlade County in northern Wisconsin (see results). Median growing season in this area falls in the range of 115–128 days between killing frosts, much shorter than the range of 143–170 days in the main portion of the range occupied in southern Wisconsin (Moran & Hopkins 2002). To test the ability of *D. laciniatus* to produce viable seeds during the shorter growing season in Langlade County, seeds harvested from several mature stalks on 2 December 1999 were planted in a greenhouse. A haphazard selection of approximately half (36) of the seeds were planted on 6 December 1999, whereas the remaining 34 seeds were held under refrigeration (mean daily temperature: 2.7–5.2°C) on moist paper toweling in a darkened container for 63 days and planted on 7 February 2000. Seeds were planted three per pot (8.2 cm by 8.2 cm) in commercial potting soil, and pots were held in trays of water under natural light. Pots were checked for seedlings daily.

RESULTS

We observed *D. laciniatus* at three locations in two Wisconsin counties where it had been collected previously near the edge of its range. Two locations were in northeastern Winnebago County along U.S. Highway 41: (a) small stands of plants (UWGB30407) were scattered along both sides of the highway over a distance of approximately 1.6 km between State Highway 44 and 9th Avenue in Oshkosh (T18N, R16E, S27,28,33,34) and (b) approximately 23 km northeast of the first site, a large, dense stand occurred at the U.S. Highway 10/ State Highway 441 exit ramp in Menasha (T20N, R17E, S9). In Waupaca County, several plants occurred at a rural residence on the north side of State Highway 54 approximately 0.5 km east of the Green Bay and Western railroad crossing near Royalton (T22N, R14E, S6). The plants were far enough from the roadside and close enough to ornamental plants that they may have been the result of a deliberate planting.

A small, widely disjunct population in Langlade County, Wisconsin, was located just south of State Highway 64 on Elton South Road (T31N, R14E, S16). Three mature, flowering stalks occurred on the east side of the road, across from six mature plants on the west side (UWGB20409). Approximately ten similar roadsides within 3 km of the Elton South Road site were surveyed without finding additional plants.

In 2006, several dozen plants were observed in Vernon County (SMUMN PC001) in the right-of-way between the west side of State Highway 35 and the Burlington Northern railroad tracks just south of County Road UU (T12N, R7W, S28). They were also observed but not collected further north along State High-

way 35 between Genoa and Stoddard. The Vernon County locations are not unexpected in light of a previous collection in the northwest corner of Crawford County (Wisconsin State Herbarium 2000).

In Minnesota, *D. laciniatus* was found at two locations in Winona County and *D. fullonum* at a third. (1) We observed a single, mature *D. laciniatus* (MIN 438447) on 21 September 2001 along the railroad tracks that skirt the north side of Farmers' Community Park (T106N, R8W, S8). We removed the plant after tying a plastic bag around its inflorescences to catch any falling seeds, and we have observed no additional plants in subsequent years. (2) On 29 December 2005, scattered clumps of *D. laciniatus* were observed along several km of State Highway 76 south of interstate Highway 90 (MIN 540914). (3) On 23 July 2006, several dozen flowering *D. fullonum* were found in pastured land along Pine Creek upstream from School Section Road (T105N, R9W, S25). A return visit on 6 August 2006 revealed flowering plants for at least one km upstream and several hundred m downstream from the road crossing (MIN436881).

Germination success in the greenhouse was high, and seeds of *D. laciniatus* apparently did not require additional cold treatment to germinate. Of the seeds planted without a cold treatment, 69.4% germinated, whereas 76.5% of those sown after refrigeration germinated. Seeds that had not been chilled germinated from 11 to 24 days after planting (mean = 16.5 days, standard error = 0.9 day), whereas seeds that were chilled germinated from 9 to 16 days after planting (mean = 10.1 days, standard error = 0.4 day) (Fig. 1). All plants in both groups were measured on March 29, 2000. Although the plants that had undergone cold treatment as seeds were sown 63 days after the others, their mean height was greater (8.4 cm vs. 4.7 cm). We note that temperature in the greenhouse was not well controlled during the germination trials. During the 64 days subsequent to the first planting, mean daily minimum and maximum temperatures were 14.6°C and 38.8°C, respectively, whereas corresponding values during the 60 days following the planting of the chilled seeds were 18.5°C and 43.5°C.

DISCUSSION

Our observations of *D. laciniatus* in Winnebago and Waupaca counties were not unexpected. As discussed by Solecki (1993), highways serve as important dispersal corridors for *D. laciniatus*. The species was first collected in Winnebago County in 1971 in a cemetery adjacent to Wittman Field (Harriman, personal communication), very near the Oshkosh location reported herein. Simple diffusion dispersal along the highway from Oshkosh, however, cannot be used to explain the origin of the Menasha population, because the intervening route includes nearly 2 km of causeway and bridge over Lake Butte des Morts. There is ample evidence for frequent "jump dispersal" of *D. laciniatus* through human intervention, including its association with cemeteries (e.g., Pohl & Sylwester 1962, Salamun & Cochrane 1974).

The Langlade County population of *D. laciniatus* was less expected. This site is widely separated from the main portion of the range, and it occurs in a land-

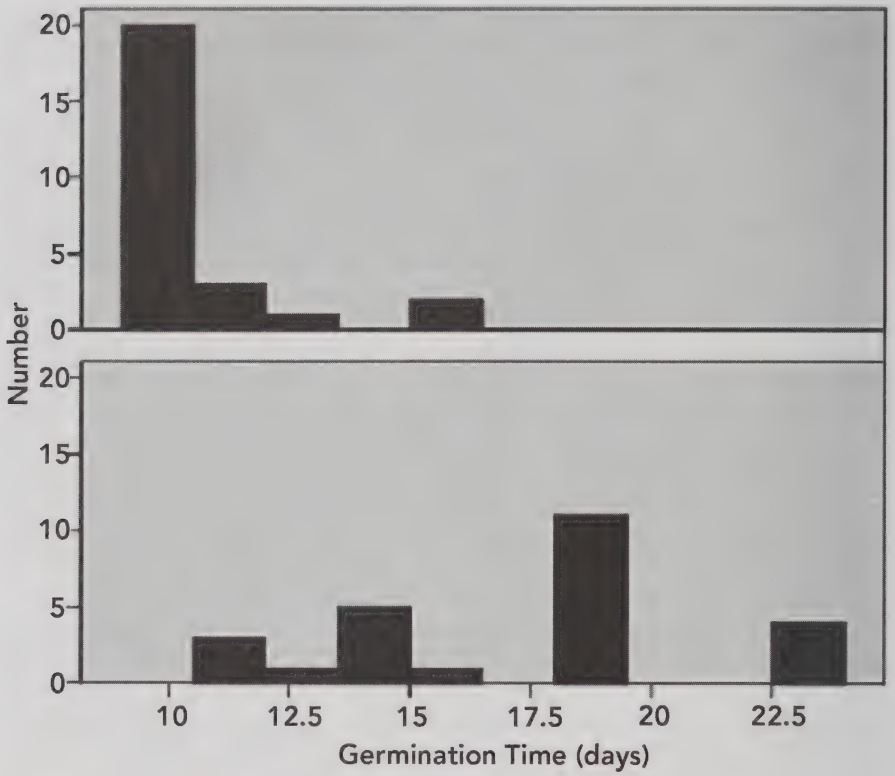

FIGURE 1. Germination times in days for seeds of *Dipsacus laciniatus* collected in Langlade County and provided with an additional cold treatment (upper panel) or not provided with a cold treatment (lower panel).

scape that is much more forested. However, a small horse corral adjacent to the roadside where the larger clump of plants is situated may have contributed to the habitat disturbance that favors establishment of teasel. Also, it is possible that teasel seeds were originally brought into the area with food for the horses.

Previously reported maps of the range of *D. laciniatus* are somewhat inconsistent. Solecki's (1993) map showed *D. laciniatus* to range well into central and northern Wisconsin, whereas the Wisconsin State Herbarium (2006) implies that *D. laciniatus* was confined to the southern half of the state. The latter map, however, was based only on specimens in the University of Wisconsin-Madison collection.

The small number of plants at the Langlade County site suggested that the population was newly established, perhaps first generation, and we conducted germination trials to assess whether plants at this northern location had had enough time to produce viable seeds during its shorter growing season. We tested the effect of chilling because some workers have implied through their

choice of methodology (Huenneke & Thomson 1995) or descriptions of life history (e.g., Werner & Caswell 1977) that a period of chilling might be necessary prior to germination. Despite our lack of control for the effect of seasonally changing photoperiod and the imprecision of temperature regulation in our greenhouse, the relatively high germination rates that we obtained, comparable to those in previous studies of teasel species (e.g., Solecki 1993, Huenneke & Thomson 1995), indicate that the Langlade County plants are capable of producing fully viable seeds. Moreover, our results are consistent with those of Werner (1979) and Solecki (1989) in that they imply that a period of chilling is not required prior to germination (at least no longer than what our seeds experienced before they were harvested in early December) (Fig. 1).

Teasel species display flexibility in their production of seeds and the timing of their germination. For example, Solecki (1989) found that viable seeds were produced by *D. laciniatus* even within flowering heads that were cut before flowering was complete. Werner & Caswell (1977) reported that *D. fullonum* seeds generally germinate in the first spring after falling from the flowering head, but that some also germinate the second spring. Our results suggest the additional possibility that some teasel seeds may be capable of germinating in the fall of the same year they are produced. Moreover, although our results are preliminary, they suggest the intriguing possibility that seedling growth may be related to the timing of germination in an adaptive way. It would be more advantageous for seeds that germinate in the fall to form winter rosettes, whereas it might be more advantageous for plants that germinate in the spring to invest more quickly in growth in height to permit neighboring plants to be overtopped.

Prior to this study, it might have been supposed that climatic factors had prevented teasel from becoming established in northern Wisconsin and Minnesota. Our results suggest that *D. laciniatus* is physiologically capable of maturing and reproducing well north of the main body of its current range, and they emphasize the importance of early detection and control of newly established populations.

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FAIRY SPARKLERS (*XYLARIA TENTACULATA*, XYLARIACEAE), A RARELY SEEN FUNGUS IN OHIO

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ABSTRACT

Fairy Sparklers (*Xylaria tentaculata*, Xylariaceae) is reported and illustrated from Ohio, from 2006 collections in Cuyahoga and Pike Counties, and an historical collection from Hamilton County. Populations ranged in size from 75–100 individuals. The species is rarely collected, perhaps due to its unobtrusive habit and small size, and may be sought in similar habitats in late summer.

Keywords: *Xylaria tentaculata*, Ascomycetes, fungi, Ohio

Xylaria tentaculata (Fairy Sparklers, Xylariaceae, Ascomycetes; Figure 1) was first described by Berkeley and Curtis (1869) from material collected in South Carolina by Ravenel, and based on a manuscript written by Ravenel. In the New World, the species has been reported from the United States (Bessette et al. 1997), Cuba (Berkeley and Curtis 1869), and Mexico (San Martin and Rogers 1995); it has also been reported from Sri Lanka (formerly Ceylon; Lloyd 1924; Saccardo 1882). In the United States, it is known mostly from the southeastern states (Bessette et al. 1997), with specimens known from Delaware (Farr et al. 2006), Maryland (Farr et al. 2006), North Carolina (Lloyd 1911a, 1920), South Carolina (Berkeley and Curtis 1869), Tennessee (Callan and Rogers 1990), and West Virginia (B. Roody, pers. comm. 26 Sep 2006). It has also been documented from Indiana (Bloomington, Monroe County; J.D. Rogers, pers. comm. 1 Sep 2006) and New York (swamp north of Geneva, Ontario County, Brown 1913). Cincinnati mycologist Curtis Gates Lloyd discussed the species in several publications (Lloyd 1911a, 1911b, 1920, 1924), though he did not include it in his "*Xylaria* Notes" (Lloyd 1918 a, b), and cited no Ohio specimens. Cooke (1883) classified *X. tentaculata* in his group *Xyloglossa*, with smooth stems and the body of the fungus fertile throughout. Rogers (1985) placed the species in the *Xylaria comosa* group of his Section II, since its conidia are produced on thin hair-like appendages attached to the teleomorphic body.

The only mention of *Xylaria tentaculata* as part of the fungal flora of Ohio is that by Wm. Bridge Cooke in his unpublished manuscript on the Ohio mycological flora in the archives of the W.S. Turrell Herbarium, Department of Botany, Miami University. In his manuscript, Cooke lists "*Xylaria tentacula*" as present in Ohio based on a specimen in the Iowa University herbarium (IA), now housed at Iowa State University (ISC). A request for the specimen on loan turned up a

FIGURE 1. *Xylaria tentaculata* specimens from Ohio. Right: Pike County material. Left: Cuyahoga County material. Note: pin is 27mm in length.

specimen from Preston, Hamilton County, Ohio, dated 1891. Queries to Ohio herbaria (BHO, CINC, KE, OS) turned up no material of the species. National mycological herbaria (BPI, F, FH, NY) were also searched for Ohio specimens of the fungus, but none were located.

The development of *X. tentaculata* was described in detail by Brown (1913). The fungus begins as an upright club-shaped structure that branches at the tip when it reaches 15–20 mm in height; each branch divides again, lengthening to up to 16 mm. After branches form, conidiophores form on them laterally, on which hyaline conidia are produced. Rogers (1985) states that the conidia are produced holoblastically and sympodially on stroma or coremia on the branches, and secede passively. Brown (1913) stated that the sexual structures form in the upper portion of the club-shaped body, the latter expanding into a swollen region from which perithecia project as papillae. Callan and Rogers (1990) illustrated the asci, containing 8 ascospores with an evident germ slit, found in this swollen region. Callan and Rogers (1993) report that *X. tentaculata* produces sclerotia in culture.

Xylaria tentaculata occurs in wooded habitats on leaf litter or on decaying wood, and is often found from July to October (Bessette et al. 1997; Callan and Rogers 1990). The new Ohio sites are in Cuyahoga and Pike counties, in similar wooded habitats. Fruiting bodies were found in large numbers (75–100) at each of these sites, and were in evidence over a period of several weeks (early August to early Spetember), after which they disappeared. It is quite likely that the fungus may be found at other Ohio sites, and has merely been overlooked, due to its small size and unobtrusive form.

SPECIMENS EXAMINED: OHIO: Cuyahoga County, North Chagrin Reservation, Cleveland Metroparks, 2 Sep 2006, *K. Metcalf s.n.* (MU); Hamilton County, Preston, 1891, *A.P. Morgan 94* (ISC); Pike County, Pike Lake State Park, on decaying log, 15 Aug 2006, *M.A.*

Vincent & M.W. Vincent 13023 (MU); ibid, on leaf litter, 18 Aug 2006, *M.A. Vincent & M.W. Vincent 13189* (MU).

ACKNOWLEDGEMENTS

We wish to thank Bill Kurpiewski for the initial identification of the Cuyahoga Co. material. Dr. Jack D. Rogers, Washington State University, provided information on the distribution of the species in North America. We thank Deb Q. Lewis (ISC) for locating and providing access to the Morgan specimen, and to the curators/collections managers of herbaria BHO, BPI, CINC, F, FH, KE, NY, and OS for looking for material at their institutions.

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NOTEWORTHY COLLECTION

MINNESOTA

Pistia stratiodes L. (Araceae). Waterlettuce.

Previous knowledge: Pistia stratiodes is a free-floating aquatic plant native to South America. The history of its introduction to Florida and its ecological impact there and elsewhere have been reviewed by Schmitz et al. (1993). Although it has been largely supplanted by the competitively superior water hyacinth (*Eichornes crassipes*), another nonnative invasive species from South America, nearly 1500 hectares of public waters in Florida were estimated to be infested by waterlettuce in 1991. Like water hyacinth, waterlettuce forms dense floating mats that shade submerged plants, reduce dissolved oxygen levels, and increase siltation.

Waterlettuce is generally considered to be a tropical species. It is widely available in the United States for use in large aquaria and water gardens. The National Plant Data Center has mapped occurrences of waterlettuce along the Atlantic coast as far north as New York (USDA, NRCS 1999).

Significance. Waterlettuce was found in Lake Winona, in the city of Winona, Winona County, Minnesota. The lake is divided into two basins by the Huff Street causeway. The western basin, hereafter referred to as upper Lake Winona, is approximately 1 km long, with a surface area of 36 hectares and a maximum depth of 7 m (Fremling and Heins 1986). It is fed at its western end by County Ditch 3, which carries water from the Gilmore Creek watershed. The ditch is approximately 10 meters wide where it enters the lake and is shallow and slow-moving. The eastern basin, henceforth referred to as lower Lake Winona, is approximately 2 km long, with a surface area of 93 hectares and a maximum depth of 12 m (Fremling and Heins 1986). It is connected by a culvert to the upper lake. Both basins are relatively shallow and have extensive areas vegetated by aquatic macrophytes.

We first observed waterlettuce during an electrofishing survey in upper Lake Winona on 2 October 2000. At that time we estimated that several dozen plants occurred in County Ditch 3, which had no detectable flow during the time that these and subsequent observations were made. Waterlettuce plants occurred along both shorelines of the ditch within 75 m of its mouth, where the ditch is bordered to the north by Winona Senior High School and to the south by a public biking and jogging path. Relatively large and small plants in a small sample collected during electrofishing had outer leaves that measured 13–15 and 10 cm in length, respectively.

Subsequent observations on 9 October and 12 October 2000 revealed no additional plants in County Ditch 3 in the 100 m reach upstream from those found earlier. However, additional plants were found around the periphery of upper Lake Winona, and a single plant was found in lower Lake Winona. Over 250

FIGURE 1. Waterlettuce (*Pistia stratiodes*) removed from Lake Winona, Winona County, Minnesota, during October, 2000.

plants were removed from the system (Figure 1). The plants appeared to be entering a senescent state. Water temperature was 12°C on 9 October but was not measured on the other dates.

After the Saint Mary's University (SMU) authors reported their discovery of waterlettuce in October 2000 to the Minnesota Department of Natural Resources (DNR), ensuing local publicity (Christenson 2000, Gustafson 2000) stimulated reports by Winona State University personnel that waterlettuce (1997–1999) and other nonnative invasive floating plants (*E. crassipes*: 1995–1996; *Salvinia molesta*: 1997–1998) had occurred in Lake Winona in prior years, with several hundred water lettuce plants having been removed from the western end of upper Lake Winona and County Ditch 3 in 1999 (Carol Jefferson and Neil Mundahl, personal communication).

A review of previous work on the life history of waterlettuce (Datta & Biswas 1970, Dray & Center 1989, Pieterse et al. 1981) suggests that its occurrence in Lake Winona in multiple years is best explained by repeated introductions of individuals originally held in aquaria or water gardens. It is unlikely that individual plants can survive the Minnesota winter, even though aerators on Lake Winona keep small areas of its surface free of ice. Although it is conceivable that plants introduced early in any given growing season could produce seeds before the onset of cold weather in the fall, it is unlikely that seeds that have overwintered in Minnesota would germinate in time to permit the production of seeds

during the second growing season. Pieterse et al. (1981) indicated that seeds do not germinate until temperature exceeds 20°C.

Concentrations of large numbers of waterlettuce plants at the western end of the upper lake indicate that waterlettuce was introduced in that vicinity, probably into County Ditch 3. Plants introduced during spring or early summer would be able to proliferate asexually in the ditch during the summer; individuals that drifted or were blown into the lake proper could be propelled by prevailing westerly winds to other portions of the shoreline.

Even though we do not believe that waterlettuce will be permanently established in Minnesota, we believe that this case is noteworthy for two reasons. First, quantitative analyses of patterns in the ecology of exotic species require data on failed introductions as well as the establishment of successfully reproducing populations (Allen & Ramcharan 2001). Second, the occurrence in any area of obvious, relatively easily observed exotic species may serve as a warning that other, less readily detectable species are also being introduced; some of these may be capable of establishing persistent populations. In the present case, it is easy to imagine the possibility that other organisms (e.g., algae, snails, or fish) were intentionally or unintentionally introduced into Lake Winona when waterlettuce and other plants were released. Indeed, one of the authors (PAC) collected an adult redear slider (*Trachemys scri*pta), a turtle native to the southern U.S., in Lake Winona in September 2002.

It is fortunate that the waterlettuce and other floating plants reported here were released into the relatively confined waters of Lake Winona rather than into the nearby Mississippi River. It is possible that the river could carry floating plants far enough south that the length of growing season would no longer prevent the establishment of successfully reproducing populations. We hoped that local press releases (Christenson 2000, Gustafson 2000) would help educate the public about the danger of releasing aquarium species. No waterlettuce has been observed in Lake Winona during subsequent years, although the presence of Eurasian watermilfoil (*Myriophyllum spicatum*) was confirmed in 2006.

Specimen citation. MIN 456176.

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NOTEWORTHY COLLECTION

WISCONSIN

RUELLIA HUMILIS Nuttall (Acanthaceae). Fringe-leaf ruellia, hairy ruellia, hairy wild petunia, wild petunia.

Previous knowledge. In Wisconsin *Ruellia humilis* is a rare and endangered prairie species adapted to periodic fires and vegetation disturbances on open dry sandy ground and limestone/dolomite outcrops (WDNR, 2004). The distribution of *R. humilis* in Wisconsin is documented for one central county (Portage) (Wisflora, 2006), two northeastern counties (Outagamie, Winnebago) (Eddy 2005) and five counties in the two southernmost-tiers of the state (Crawford, Dane, Grant, Rock, Walworth) (Wisflora, 2006).

Significance of the report. A recent collection of *R. humilis* in Green Lake County narrows the distance of known populations between the southern and the central/northeastern counties of the state. On 22 July 2006 a small population was discovered growing on a dry prairie remnant in the WDNR White River Marsh Wildlife Area nine miles west of the city of Berlin off the west side of County Trunk E (NW 1/4 SE 1/4 Section 2, T17N, R11E). GPS latitude/longitude coordinates for the site are N43°58.159′ W089°09.114′ at 812 feet above sea level.

Groundcover at the *Ruellia* site varies from exposed dry sand with a broken crust of lichens (*Cladonia*) to interspersed patches of smooth brome and sheep fescue. The likelihood of *R. humilis* seed having been deliberately introduced during a restoration planting is nil—historically no such plantings are known to have occurred at this location (Jim Holzwart, WDNR Wildlife Biologist, personal communication, 31 July 2006).

Associates of *R. humilis* at the Green Lake County site include: *Achillea millefolium*, *Antennaria neglecta*, *Aristida oligantha, Asclepias amplexicaulis, A. syriaca, A. tuberosa, A. verticillata, Baptisia bracteata* var. *glabrescens, Carex pensylvanica, Cyperus filiculmis, C. schweinitzii, Eragrostis capillaries, Euphorbia corollata, Gnaphalium obtusifolium, Hieracium longipilum*, *Koeleria pyramidata*, *Krigia virginica, Lespedeza capitata*, *Liatris aspera, Lithospermum canescens*, *Lupinus perennis, Monarda fistulosa, Oenothera perennis*, *Panicum commonsianum* var. *euchlamydeum*, *Penstemon grandiflorus* (county record), *Physalis longifolia*, *Rosa blanda, Rubus flagellaris, Schizachyrium scoparium, Solidago nemoralis, Tradescantia ohioensis* and *Verbena stricta.*

Woody plants include *Juniperus virginiana*, *Quercus ellipsoidalis, Q. velutina, Pinus strobus and Prunus serotina,* while noted weeds are *Bromus inermis*, *Conyza canadensis, Festuca ovina, Hieracium aurantiacum, Mollugo verticillata*, *Rumex acetosella, Silene vulgaris, Tragopogon dubius* and *Verbascum thapsus.*

Diagnostic characters. R. humilis flowers near the end of June to mid-September and is in fruit from the end of July through September. The blue-

lavender inflorescence appears both singly or in clusters of the upper leaf axils. Petals are 3–7 centimeters long, united into a long funnel-like tube with spreading lobes. Dark stripes appear at the base of the corolla lobes, presumably to guide pollinators. Four stamens are joined near the base in pairs, along with a single staminodium that is frequently present. The fruit of *R. humilis* is a slightly flattened, two-chambered capsule that contains three to eight seeds per chamber.

Specimen citations. PORTAGE CO.: Freckman 27207, 1993, UWSP; OUTAGAMIE CO.: Hans s.n., 2003, OSH; WINNEBAGO CO.: Harriman and Lammers s.n. 2005, OSH; CRAWFORD CO.: Eldred 92-87, 1992, WIS; Walz & Walz, s.n., 1990, WIS; Goessl s.n., 1921, WIS; DANE CO.: Zimmerman s.n., 1995, WIS; GRANT CO.: Sime 9705, 1997, WIS; Sime 98-06, 1998, WI; WALWORTH CO.: Aust s.n., 1940, WI; ROCK CO.: Baller s.n., 1987, UWSP; Moran s.n., 1975, WIS; Lathrop s.n., no date, WIS; McElhenny s.n., no date, WIS; Lapham s.n., no date, WIS; Hale s.n., no date, WIS; Swezey, s.n., 1875, WIS; Hale s.n., no date, WIS; Wadmond, s.n., 1931, WIS.

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THE BIG TREES AND SHRUBS OF MICHIGAN
50. Acer rubrum L.
Red Maple

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The largest known Red Maple in Michigan is located in China Township, southwest of St. Clair, MI in St. Clair County in the southeastern portion of Michigan's Lower Peninsula.

Description of the Species: Bright red flowers appearing before the leaves in the spring, red twigs and light gray bark on young trunks and branches immediately identifies trees having these characteristics as Red Maples. The leaves are opposite, simple and 3–5 lobed. The lobes are irregularly serrate and are separated by broad sinuses (See Fig. 1). The fruit is a samara characteristic of the family Aceraceae but is smaller than those of many other species of maples. The wings of the samaras are only 2–3 cm long. The leaves turn bright red, orange and/or yellow in the fall. Red maples are frequently planted due to their bright red coloration. In nature, Red Maples occur in wet lowland places in the southern part of the state. In the northern part of the Lower Peninsula they may also be found on more mesic upland sites. In the Upper Peninsula they occur in mesic forests but are more frequently seen in conifer-hardwood swamps.

Location of Michigan's Big Tree: The State Champion Red Maple is located at 6700 Puttygut Rd. in China Township in St. Clair County. To reach the tree, take State Route 29 south from Port Huron through St. Clair, MI. Turn left on Chartier Rd. and go west 0.4 mi to King St. Turn right and go 5.3 mi to Puttygut Rd. Turn left and go west 3.5 mi. to 6700 Puttygut Rd. A yellow (fading to gray) barn is located behind the house and across a pasture. The tree is about one mile down a 2-track east of the barn. The coordinates for the barn are 42° 47.222′ N X 82° 34.834′ W. The coordinates for the tree are 42° 47.339′ N X 82°34.763′ W.

Description of Michigan's Big Tree: The tree has a single, solid, healthy trunk. The first branch occurs nine feet from the ground. I measured the girth on Sept. 3, 2003 at 233″. Subsequent measurements by North Carolina Big Tree Hunter, Will Blozan, and Robert Bloye of the Michigan State University Forestry Dept. gave nearly identical measurements. The height was measured by EBE at 116′, WB at 120′ and RB at 114′. The average of these three is 117'. The crown spread was measured by EBE at 86′ and by WB at 82′.

FIGURE 1. Documented distribution in Michigan and characteristics of the Red Maple. The map is from Voss (1985). The asterisk shows the location of the State Champion tree. The illustration is from Barnes and Wagner (1981). 1. Winter twig, × 1. 2. Portion of twig enlarged. 3. Leaf, × 1. 4. Male flowers, × 1 1/2. 5. Male flower, enlarged. 6. Female flowers, × 1. 7. Female flower, enlarged. 8. Fruit, samara, × 1.

The average is 84′. With a girth of 233″, a height of 117′ and a crown spread of 84′, the total points (G + H + 1/4 X C.S.) are therefore, 233 + 117 + 1/4 X 84 = 371. These measurements replace the 2003 measurements reported in Ehrle (2006).

INVITATION TO PARTICIPATE

If you would like to join in extending this series of articles by visiting and describing one or more of Michigan's Big Trees, please contact Elwood B. Ehrle (woodyehrle5098@sbcglobal.net) for help with locations, specifications for taking measurements and assistance with the manuscript. The Michigan Botanical Club encourages your involvement with this activity. Please remember to ask permission before entering private property.

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BOOK REVIEWS

Kalamazoo Nature Center. 2006. *Garlic Mustard—From Pest to Pesto. A Culinary Guide.* Kalamazoo Nature Center, 7000 North Westnedge Ave., Kalamazoo, MI 49009-6309 (269)-381-1574 www.natureceenter.org. (Paper) $5.00

Dealing with alien plants and animals is becoming more and more a part of everyday life. To control them most persons grab some pesticide, a few try some alternative method, and a select few try to eat the pest. A group of 11 Chefs have pooled their knowledge of gourmet cooking and have compiled a 21 page booklet of information on garlic Mustard, *Allaria petiolata*. Page 1 explains the problem of this plant while page 2 uses line sketches to inform the reader on how to recognize the plant from other members of the mustard family, Brassicaceae. Page 3, is blank and devoted to notes. The Contents on page 4 list 19 recipes under three headings: Appetizers & Snacks, Soups, Salads, & Sandwiches, and Entrees. A survey of the recipe list gives something for every pallet and just might help make a dent in the alien population found on your property. What an impact every household in Michigan would have on wild invasive Garlic Mustard if we all began to eat this plant everyday? I'm sure the nature center would love to sell many copies of this booklet, where the monies generated are part of a center fundraiser. Let's go for it!

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Wheeler, K. G. R. 2004. *A Natural History of Nettles.* Trafford Publishing, 2333 Government Street, #6E, Victoria, BC, V8T4P4, Canada, 300 pp. ISBN 141202694-6 $26.29 (Includes CD of text images in color).

When my computer dinged recently I found an e-mail from a colleague in England who said: "Did you know someone has recently published a book on the natural history of stinging nettles?" "Stinging nettles," I muttered to myself. "Who would do such a thing?"

I began research into the biology of stinging nettles during the summer of 1966, after falling into a patch of them on a return backpacking trip into the Cabinet Mountain Wilderness Area of northwestern Montana. The pesky stinging plants were difficult to identify with certainty because of great character varia-

tion in the leaf morphology. Since that fateful day, I have learned much about nettles but never thought someone would write a book about this scourge of fishermen, gardeners, naturalists and scientists until now.

The author, Keith Wheeler was born, raised and educated in England through the Ph.D. It was at Exeter University that he completed a dissertation on the morphology and ecology of *Urtica dioica*, the European Stinging nettle. This book appears to be a compilation of many of the interesting scientific and folklore tidbits about all nettles he gleaned in preparing his dissertation. In the Great Lakes area we have commonly *U. dioica* subsp. *gracilis* (slender nettle) and the occasional introduced population of *U. dioica* subsp. *dioica* from Europe. Most of the comments in this book can apply to our native taxon.

The 300 pages of this book are chucked full of information. In it Wheeler presents general studies (e.g. folklore, herbal, food and fiber use, how nettles were used during the World Wars, domestic uses, and effect on the body). There is discussion about the other members of the stinging nettle family, Urticaceae, from other parts of the world (*Dendrocnide*—nettle trees, *Urera*—shrub nettles) that sting, or non-stinging species used in cultivation for house plants (*Pilea, Pouzolzia,* and *Soleirolia*). He discussed the stinging hair and the mechanism of how and why a person is stung. The photos and illustrations are easy to understand here and in other parts of the book. There is also discussion about other stinging plants, like members of the Hydrophyllaceae and Loasaceae. There is discussion on nettle reproduction, the insects and butterflies that feed on these plants, ecology, and variation and evolution of nettles.

Two minor omissions were noted: p. 283, Fig. 18.11 is *Pilea peperomioides*; and the book is lacking one of the earliest reference referring directly to nettles I am aware of: Aldhelm. 695. *Epistola ad Acircium de Metris*. (In Latin: The Riddles of Aldhelm).

There is no color in the book but all of the many photographs and micrographs are in color on an accompanying CD inside the back cover. The book is paperbound with a bright color montage of photographs found within the text—very eye catching. I think many *Michigan Botanist* readers will enjoy reading about this most maligned, ubiquitous, noxious weed. At $26.29 it is not priced too high.

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Louv, Richard. 2005. *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder.* Algonquin Books of Chapel Hill, Chapel Hill, NC 323 pp. ISBN-10:1-56512-391-3 $24.95 Hard bound.

In recent years various biologists, including this reviewer, have become concerned that the interest in natural history, and botany in particular, is shrinking slowly and botany as a profession is becoming a career of the past. The future of choosing a botanical profession to make a living is changing, and not for the better—fewer university botany departments and field orientated courses offered, fewer good paying jobs for organismal trained people, and a drop in enrollment in field courses compared to more laboratory orientated courses.

Richard Louv is a child advocacy expert who writes and lectures on the values of family, nature and the community. He directly links the lack of child involvement with nature today in the lives of our children to some of the disturbing ills observed: child depression, Attention Deficit Disorder (ADD), and the rise in obesity. He points out that the rate by which doctors prescribe antidepressant drugs to children has doubled in five years, that the radius around the home in 1990 where children roam on their own has shrunk to one-ninth of what is was twenty years earlier, today's cartoon characters are better identified by the average eight-year-old than native species in their home yard, and today's child is more "tuned in digitally" than naturally. Nature is portrayed as something to be feared instead of explored and enjoyed.

You will not find "nature-deficit disorder" in a medical dictionary. It is a description of the human costs of alienation from lack of contact with nature. According to Louv, this lack of "nature plug-in" ultimately damages children, influences their choices in choosing professions and academic programs, and shapes their adult lives, families and communities. The solution Louv believes is in our back yards.

The book has 23 chapters divided into seven parts under such titles as: Part I: The New Relationship Between Children and Nature, Ch. 1–3; Part II: Why the Young (and the Rest of Us) Need Nature, Ch. 4–8; Part III: The Best of Intentions: Why Johnnie and Jeannie Don't Play Outside Anymore, Ch. 9–12; Part IV: The Nature-Child Reunion, Ch. 13–15; Part V: The Jungle Blackboard, Ch. 16,17; Part VI: Wonder Land: Opening the Fourth Frontier, Ch. 18–20; and Part VII: To be Amazed, Ch. 21–23.

This is a must read book for any person interested in spreading the "nature gospel" to their children or grand children, and to the educator involved in stimulating young minds to get turned on to nature. Richard Louv may have found the solution to the decline in interest in the botanical world as we know it in North America. The future of botany and natural history may depend on it.

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Ward, B. J. 2004. The Plant Hunter's Garden. The New Explorers and Their Discoveries. Timber Press, Portland, OR 340 pp. ISBN 0-88192-696-5 $39.95.

From the earliest days of recorded history to the present time humans have been transporting plants from one place to another. This movement included economic potential plants such as cotton, tea, rubber, and coconut, medicinal plants like quinine for treating malaria and male fern for the treatment of internal parasites, and food plants like potato, wheat, apple, breadfruit and cassava. There was also the drink of the god's and kings, chocolate, grapes for wine, societal plants like marijuana and tobacco, and horticultural plants like the tulip bulbs used in Holland as a form of currency.

Most students of wild and horticultural plants have all heard of the early "plant hunters" like E. Wilson, and F. Sergeant. But yet, when I go to a better nursery (e.g. Wavecrest Nursery, Fennville, MI), I see new things from the wild being sold to the public each year. Where are these things coming from and who are the 21st Century plant hunters?

Dr. Bobby J. Ward a trained botanist and environmental scientist from North Carolina State University and past President of the North American Rock Garden Society has written this fascinating book, for the student of botanical history. In 23 chapters he summarizes the exploits of contemporary plant hunters from the far shores of Asia to Mexico, the American Southwest and the Rocky Mountains. Ward profiles 32 explorers who have been collecting interesting plants to introduce to the public gardens from their nurseries (web sites included). Some are obvious exotics while others are some of our more spectacular native plants. Each of these plant adventurers is asked to profile their favorite plants and tell something interesting about them. Each chapter is illustrated with fine color images of these and other plants to add to ones garden or natural area on their property.

From the comfort of a cozy chair, beside a crackling fire, the reader can be transported to some interesting location and the challenges to bring the wild species to gardens. This book will enlighten the amateur botanist and professional alike to the joys of exploring the green world. It will be a fine addition to your "fun" botanical reference library.

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Spichiger, R-E., V. Savolainen, M. Figeat, and D. Jeanmonod. 2004. *Systematic Botany of Flowering Plants. A new phylogenetic approach to Angiosperms of the temperate and tropical regions.* Science Publishers, Inc., Enfield, NH. 413 pp. ISBN 1-57808-373-7, Paper $58.00; ISBN 1-57808-315-X, Hard $85.10

With the advent of using DNA to attempt to determine relationships between different plant groups the classification of Angiosperms (flowering plants) has taken a major shift from what was known in the past. This new text is an English translation of *Botanique Systematique des Plantes a Fleurs, Und approche phylogenetique nouvelle des Angiospermes des regions temperees et tropicales, Presses polytechniques et universitaires romandes, Lausaane,* 2002. Second updated and enlarged edition.

A major objective of the book is to provide descriptions of flowering plant families according to the current classification of the Angiosperm Phylogeny Group (APG) as presented at the web site: <http://www.mobot.org/MOBOT/Research/APweb/welcome.html>. This site is updated almost daily as new molecular systematics research is published. This second edition also has some added families the French first edition did not. These include the Alliaceae, Cornaceae, Droseraceae, Lythraceae, and Oleaceae, families of importance in the Great Lakes region.

The book has a CD-ROM of 351 color images of fine quality species examples found within the 113 families discussed in detail. There are summary tables on uses and keys to identification. As the authors say, the book applies to the major flowering plant families of the temperate European flora and some tropical regions.

The first 93 pages are divided into five chapters. Chapter one deals with the "History of Botanical Classification" from the Greeks to today's molecular classification concepts. Chapter two deals with "Species and Speciation," while Chapter three discusses "Floras and Vegetations" from early fossil floras to the present vegetational biomes of the world. This topic has not normally been covered in today texts. Chapter four covers plants from "Algae to the Angiosperms," including the groups morphology and general plant reproduction. This is a brief general botany survey of the plant kingdom. Chapter five looks at the "Evolution and Classification of Plants with Seeds." It begins with a look at the fossil Cycadophytes and ends with a comparison of current higher groupings and orders of flowering plants. Within each higher grouping are keys to the various orders.

The rest of the book is mostly Chapter six. The first 17 pages make up a dichotomous key to the families of the orders discussed. The remaining 239 pages is a discussion of the families. Each family is divided with description information on the family on one page and line sketches and micrographs on a facing page. These images of sketches, floral diagrams, and light, SEM and TEM images are of very fine quality. This two-page setup makes for handy reading and should please students.

The book concludes with four Annexures made up of a "Glossary" (Mislabeled with "History of Botanical Classification" at the top of the pages), a "Key

to Identification of Tropical Families by Observation of Vegetative Characters," "Taxonomic Index," "List of Species Illustrated with Colour Photographs on the CD-ROM" and a final single page cladogram "General outline of the taxonomic organization of the book with a list of families described."

Some of today's texts on systematic botany seem far too complex for the serious amateur gardener and turn a person off, instead of on, to explore further. The authors of this text have tried to take a middle road perspective and yet be true to modern systematics. Whether they succeed or not remains to be seen.

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INSTRUCTIONS TO AUTHORS

1. Create text in 12-point Times New Roman font and double space paragraphs throughout. Papers should be organized as follows: Title, Author(s) and address(es), Abstract with up to 5 keywords, Introduction, Materials and Methods, Results, Discussion, Acknowledgements, Literature Cited, Tables, Figure Legends, and Figures. Sections may be omitted if not relevant. All pages should be numbered. Please contact the editor regarding any questions related to formatting.

2. For noteworthy collections, manuscripts should be formatted as described in *The Michigan Botanist*, volume 27(3) p. 90. A brief description of the formatting follows. The following title, "Noteworthy collections", should begin each submitted manuscript followed on the next line by the State or Province for the species reported. The next line should list the taxon of interest using the following format: *Species* Author(s) (Family). Common name. The rest of the manuscript should include the following named sections: Previous knowledge, Significance of the report, Diagnostic characters (if desired), Specimen citations, and Literature cited. Each of these sections are largely self explanatory; however, "specimen citations" should include the relevant label data from the voucher specimen(s) including location data, collector(s), collection number, etc. Also please include which herbarium the specimen(s) is deposited in using the Index Herbariorum acronym. The manuscript should end with the name and address of the author(s).

3. Letters to the Editor can be formatted as general text without the specific sections listed above. However, literature cited and any tables or figures should be formatted as described below.

4. Please create tables using either a tab delimited format or a spreadsheet using Excel or other similar program. Each table is to be submitted as a separate file. Table captions should be placed at the top of the table. Any footnotes should appear at the bottom of the table. Please do not insert tables within the body of the text.

5. Send each figure as a separate file in a high-resolution format—eps, jpg, or tif. Figures like bar graphs that gain their meaning with color won't work—use coarse-grained cross-hatching, etc. Create figure legends as a separate text file, and the typesetter will insert them as appropriate. Please do not insert the figure in the body of the text file.

6. Citations: Please verify that all references cited in the text are present in the literature cited section and vice versa. Citations within the text should list the author's last name and publication year (e. g. Smith 1990). For works with more than 2 authors, use "et al.", and separate multiple citations with a semicolon.

7. Literature Cited: List citations alphabetically by author's last name. Author names are to be listed with surname first, followed by initials (e. g. Smith, E. B.). Separate author's initials with a single space. The year of publication should appear in parentheses immediately before the title of the citation. The entire journal name or book title should be spelled out. Please put a space after the colon when citing volume number and page numbers.

8. Italicize all scientific names. Voucher specimens must be cited for floristic works or any other relevant study. Papers citing plant records without documenting vouchers are generally not acceptable.

9. Manuscripts may be submitted electronically to the email address of the editor. Printed versions of manuscripts may also be submitted in which case three copies should be provided. All manuscripts will be reviewed by at least two referees. A more complete set of instructions is available at http://www.michbot.org/publications/Botanist/instruct_authors.htm.

CONTENTS

On the cover: *Ruellia humilis* Nuttall on dry prairie in the WDNR White River Marsh Wildlife Area, Green Lake County, Wisconsin. In the inset photo note the four stamens and one staminodium. Photograph by Thomas L. Eddy, 22 July 2006
(see page 214 for related text).